UPDATING EDUCATION: AN ANALYSIS OF THE PAST AND PRESENT TO DIRECT THE FUTURE

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ABSTRACT

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This thesis analyzes the education system in the United States from historical, cultural, philosophical and scientific perspectives to identify areas of improvement and proposes reforms in an attempt to shift the focus of education towards developing the ability to reason. The proposal for a modified education system considers the deficiencies within the current system, the educational practices of other countries and the biological processes that occur while learning to increase efficacy of the recommendations if implemented. The evidence and information for these recommendations were mainly derived from historical texts, archived government webpages, newspaper articles, and scientific studies. The conclusion finds that interdisciplinary teaching methods and writing practice will improve critical thinking and learning abilities, and that eliminating standardized tests is the first step for systemic improvement.

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TABLE OF CONTENTS

Introduction

The United States has much to pride itself on, but its education system is one aspect that misses the mark on the global stage. If a student has truly mastered a concept or skill, they should excel in any assessment set to measure those skills. However, the United States ranked below the top 10 in math, reading and science according to the 2018 Programme for International Student Assessment (PISA) scores (Balingit and Van Dam, 2019). The consistently low rankings since 2000 were an assault on American pride, so federal legislation, like the No Child Left Behind Act, worked to bring students up to standard and become mentally competitive on a global scale (The Office of the Under Secretary, 2002). However, these efforts instigated a toxic testing culture leading to overreliance on test scores and "teach to the test" methods – indications that the education system has not moved in the right direction. This thesis works to bridge multiple disciplines to propose reforms that are beneficial to both students and educators, which will homogenize practices in a currently heterogenous/disparate education system.

I consider myself fortunate to have been enrolled in schools, both public and private, that did not succumb to the to the pressure of meeting a state standard and, instead, used their resources to promote learning. However, this was my experience at high performing schools where there were no concerns about meeting state standards. If I had gone to an "underperforming" school, I suspect that my education experience would be filled with classes that structured lessons around exams; an education filled with teachers complaining about getting behind schedule and curious students being told that their questions are "unimportant", or worse, "disruptive". Misplaced priorities have sapped students of their creativity and desire to learn, which, in my opinion, is the greatest tragedy of the US education system. This thesis is my attempt to revive the pursuit of knowledge.

To gain a better understanding of how the current education system evolved to its present state, I begin my thesis by tracing the history of the US using information from historical texts and a variety of history books- paying special attention to sociocultural and environmental factors that motivated changes in education. Using reputable newspaper and journal articles, the second chapter analyses the current education system and highlights deficiencies. Specifically, this section identifies the problem with standardized testing, the systemic overreliance on scores in general, declining student mental health and explains why "teach to the test" methods are a disservice to American students.

Unlike the first two chapters, the third chapter begins the process of improving the system by determining the purpose of education: to reason and learn. This section compiles the views of classical philosophers, Enlightenment thinkers, education theorists and experts to support this claim.

The fourth chapter draws inspiration from other countries. Although a portion of this thesis investigates if the PISA exam results can be used to assess an education system, it is curious how some countries manage to consistently outperform the US. Using case studies of Finland and Singapore, two countries that top PISA rankings, I examine the education systems, teaching practices and cultural differences, and present practices that could work to further the goal of learning and reasoning in the US education system.

In the fifth chapter, I provide the reader with a brief scientific explanation of how the brain learns- mainly drawing from psychology and biology. I then defend interdisciplinary learning and writing as two practices that are scientifically-supported methods to enhance learning. Lastly, I conclude this thesis by summarizing the findings of the previous chapters, offering recommendations to promote learning in schools and discuss a few limitations.

Chapter 1: An Abridged History of the US Education System

"Look back over the past…and you can foresee the future too."
-Marcus Aurelius

Before addressing how to change the education system, it is equally as important to understand how the system evolved to its present state. This western-dominated history of the US education system demonstrates the sociocultural and global changes that lead to current practices and is a reminder that effective reform follows the needs of the society. The historical background combined with current government plans provide a basis to merit further changes.

Religious Beginnings (1600s)

There were different foundational reasons as to why colonies were set up in America, but in the eyes of John Winthrop, the founder of the Massachusetts Bay Colony, the Christian God was his primary motivation as he ventured to the "New World". Winthrop envisioned the divine purpose of the new Massachusetts Bay colony and preached to his fellow Puritans aboard the ship Arabella that "we must consider that we shall be as a city upon a hill. The eyes of all people are upon us" (Winthrop, 1630). After the Massachusetts Bay Colony settled and spread throughout the region, it became increasingly important to preserve the Puritan way of life in the younger generations and become an example of Christianity for the world.

In addition to religion, since the colonies were still developing the land and establishing themselves, vocational training and apprenticeships were emphasized. The two motivations of religion and work are reflected in the first education law in the Americas, the Massachusetts School Law of 1642, which directed townspeople to prevent barbarity by learning to read English and understand the capital laws, train children and apprentices in Christian catechisms so

they understand the principles of the religion as well as in a profitable trade that will give them a living and benefit the society around them ("Massachusetts School Law", 1642).

Despite the good intention of educating the society and creating members that are religiously upright and useful to the colony, the act was ineffective (MassHumanities, n.d.). The general court was disturbed by the persistent parental neglect to educate their children and, in response, created a more compelling education act: The Old Deluder Act of 1647. This act capitalized on Puritan beliefs stating that Satan, the "old deluder", does not want God's people to understand the Bible, so the townspeople should learn to read and write to gain comprehension. Since parents were unreliable teachers, as demonstrated when the previous school act failed, the act introduced the need for teachers in each town and an establishment where students can learn these skills. The deluder act also mentions that this education would allow students to move on to the university level, which introduced a multi-step education system in America (Massachusetts Bay Colony, 1647). These universities trained students in literature, arts and sciences, but also allowed some students to become ministers and further serve the religious needs of society (Button & Provenzo, 1989, p.28).

The importance of religion was not limited to the northern colonies. The Spanish presence in the New World led to the proliferation of Catholicism, which prompted the foundation of English colonies to serve as a Protestant stake in addition to their economic purpose (Blinderman, 1975, p.15). Therefore, religion was emphasized in south, but not to the same extent as it was in the north. Instead of focusing on literacy skills, King Charles I created standards for knowledge where each person should be able to understand the ten commandments, the Lord's prayer, the articles of belief, and other catechisms in the book of common prayer (Hening, 1823, p.157).

The education system of this time was created to cater to the religious culture of the society, mainly encouraging literacy skills to further religious goals.

The Rise of Apprenticeships

Although religious study was important for the colonists, the fate of their society rested on if its people could make a living to benefit themselves and others. To fill societal roles, children were taught agricultural methods and trade skills from their families. Those from wealthier families hired private tutors in subjects like French, fencing, or navigation to train a class of merchants and tradesmen (Button & Provenzo, 1989, p. 29).

Location played a large role in deciding what kind of education each student would pursue. Unlike the motivations of the north, which produced scholars and ministers, colonies in the south were primarily founded to increase profits and offer trade opportunities for Europe, so most of the education was vocational. For children whose parents were unable to provide them with proper vocational training, King Charles I enacted that they can be apprenticed by tradesmen so that they will be able to make a living for themselves and not burden their impoverished parents. Some impoverished children in the south had undergone mandatory relocation under the discretion of commissioners so that they would profit the community and bolster its reputation by strengthening the workforce (Hening, 1823, p. 260-261).

The lack of interest in literacy skills may not have been solely due to colonist's greater interest in trade. The governor of Virginia, in 1671, expressed great relief that free schools were not available to colonists in the south because learning brings disobedience and heresy into the world (Hening, 1823, p. 517). Keeping southern colonists uneducated might have served the purpose of preventing rebellion and maintaining peace because, as the common phrase goes, ignorance is bliss.

Wealth was another factor that determined quality of education. Children from wealthier families were not expected to pursue a trade-based education. Instead, families were able to entertain their children's' interests by hiring a combination of tutors, clergymen, or private schoolmasters who, in addition to academic material, taught social graces like dance and music. Children of this class often were able to later continue their education by attending schools in Europe (Button & Provenzo, 1989, p. 43). Wealth determined education level, which determined profession, which, in turn, dictated wealth- a cycle that was hardly broken. This unbreaking cycle then perpetuated the social hierarchy within the colonies.

The problem of access is not limited to children of this time period, students from disadvantaged backgrounds, in the present, have a higher rate of dropping out of school than advantaged students. Low income students are also eight times less likely to obtain a bachelor's degree from a university than advantaged students. Socioeconomic status determines academic achievement, poverty and health- just like it did in the past (American Psychological Association [APA], n.d.).

Education in this time period was directed by the needs of the society. Since the south was an agrarian society, children learned useful trades instead of literacy skills. The problem of education inequality was due to differences in wealth, and access was impeded by people in power- two factors that continue to influence education in society almost four centuries later.

The Influence of Enlightenment Thinking: Reforms (1700s)

European philosophy inspired by the Greek classics permeated America and colonists began to adopt these modes of thinking. Reason, skepticism, individualism and other aspects of the Enlightenment influenced colonists to achieve more than literacy in the current education system.

Inspired by the works of John Milton and Enlightenment philosopher John Locke, Benjamin Franklin was one of the first to introduce education reforms in America. Criticizing the education system of the time, Franklin decided to create academies where students would learn material that is both useful and ornamental (Button and Provenzo, 1989, p. 46-47). Franklin observed a deficiency in the current system and believed that it was enough to merit change in the system. The curriculum of these academies continued teaching Latin, English and Greek as previous schools had done, but added additional European languages (French, German and Spanish), history, geography, chronology, logic, rhetoric, arithmetic, algebra, science, drawing and other subjects he considered useful (Button and Provenzo, 1989, p.47). Franklin's academies grew in popularity and became the dominant form of instruction in America during that time (Dexter, 1904, p. 90). Many of Franklin's proposed subjects have been preserved as core subjects in schools in the present.

The needs of society shifted during this period of Enlightenment. Introduced to the concepts of natural rights and political equality from thinkers like John Locke, the colonists concluded that the British were abusing their power and referenced these rights in the Declaration of Independence- beginning the Revolutionary War (Blinderman, 1974, p.17). The fear of the Virginian governor in 1671 was well-reasoned, the colonists learned and acted against those in power- just as he predicted.

Thomas Jefferson also picked up on the connection between the government and educated citizens. After the Revolutionary War was won and the colonies became the United States of America (US), Jefferson did not want this new government to fall under tyranny in the same way it had under British rule, so he proposed the first public education system where all children could receive an education paid for by public funds. Students in these public institutions

would learn reading, writing, arithmetic, American history, Roman, Greek and English (Jefferson and Committee, 1779). Americans had a fear of centralized intuitions in the case that it would lead to tyranny, so Jefferson's proposal passed 17 years later when it was modified to decentralize the education system (Brackemyre et al., 2015). To further prevent unrest and stabilize the new nation, Jefferson included American history as one of the proposed subjects to promote nationalism and was commonly practiced in schools (Button and Provenzo, 1989, p. 65).

The introduction of Enlightenment ideas influenced the US focus more on education and expanded the curricula of schools to be more general instead of focusing on religion and trades. The Revolutionary War and the events leading up to it reduced the American trust in centralized structures so the education system from this point onward has been under the discretion of local bodies instead of being homogenous entities controlled by the federal government. The creation of a new country resulted in the creation of a new subject, American history, to further stabilize society. The Enlightenment period in the US demonstrates how the education system was molded by sociocultural change and how educational changes can equally impact society.

Industrial Revolution: Making Education Efficient and Standardized (1800s)

The boom in mechanization increased the manufacturing power of America and led to more productivity, more profits and a higher standard of living for many. The development of the factory system divided tasks to a degree that unskilled laborers could complete them and children, who were much cheaper to employ and worked just as hard as adults, were preferred workers. The industrial need for child workers impacted the education system by reducing the number of children who attended school. Wealth was also a factor in determining education

access because most factory children were too poor to afford tuition and needed to work to support their families (Button and Provenzo, 1989, p.159).

Witnessing the dismal state of children who worked in factories, Robert Owen, a British social theorist, bought land in Indiana with a friend, William Maclure, to establish a school that was free to all members of the community, was gender-inclusive, and focused on using direct observations to increase understanding. Children learned geometry, natural history, geography, drawing, music, gymnastics, and trade education- including printing and engraving. Language education was community-based where members of the class would teach each other (Button and Provenzo, 1989, p. 74).

Owen, inspired by Swiss educator Johann Pestalozzi, wanted to create a system that supported the natural development of a child, as well as use education to help children develop a better understanding of the world (Button and Provenzo, 1989, p. 71). Pestalozzi asserted that children should learn from the maternal power of educators through direct/concrete observations and interactions (Reese, 2001, p. 12). In general, Pestalozzian ideas were embraced by educators because they countered rote memorization, textbooks, and physical discipline, but the drawback experienced by educators wanting to follow Pestalozzi was that it was unclear how to implement his ideas in schools (Reese, 2001, p. 13). Owen's experimental school also failed due to disputes in methodology between him and Maclure (Button and Provenzo, 1989, p. 74).

The Lancastrian/monitorial school system emerged around the same time as Owen's experimental school did, however this system attempted to make the education system more efficient and effective than child-centered. Demonstrating industrial concepts, older students would teach younger students as a method of dividing labor and the main pedagogical method was direct memorization for efficiency. Even the sciences, were divided into different concepts

and students memorized facts with no further exploration of subject matter (Button and Provenzo, 1989, p. 78). The system was low cost and effectively increased literacy among students, but one criticism of this system is that students were not learning the material due to lack of understanding and the strict adherence to memorization (Reigart, 1916, p. 100-101).

Another model for school was proposed by Horace Mann, a lawyer and educator, who believed that the education system was "a balance wheel of the social machinery" and that universal/ standard education will allow the talented the means to advance themselves in society and break down the artificial social hierarchy- that education was a driving force for social and political change (Button and Provenzo, 1989, p. 106). The common school movement grouped students of different ages and abilities to learn together and collaborate so all groups could master material, develop morality and critically judge the political and social needs of the nation (Button and Provenzo, 1989, p.106).

The rise of industrialization lead to the rapid development of technology, which made the apprentice system obsolete, therefore new systems of vocational training were needed so that citizens would be able to fill new roles and obtain gainful employment (Button and Provenzo, 1989, p. 159). A proposal to create a secondary school devoted to intellectual and manual training resulted in establishing the Manual Training School in 1880. Previously, trade education was career-specific, but trade schools departed from the traditional approach, and instead offered general education that could apply to a wide variety of careers. However, the curriculum of the training school included mathematics, drawing, the English branches of the high school curriculum, and training in the use of new tools (Button and Provenzo, 1989, p. 155). The overarching idea of these training schools was to improve the mind with traditional subjects and improve the body through manual training (Button and Provenzo, 1989, p. 158).

The professional shift from agriculture to industry altered the needs of society. The reforms of this period aimed to remove children from factories, but, because of increased attendance, turned their schools into factories for education. The community wanted to educate their students, so schools worked to become more efficient and standardized. The changes in industry also left many people unprepared for work, so schools were created to develop students' minds and skills. The industrial revolution altered the social hierarchies in the US and some, like Mann, believed that people should earn a place in society based on talent therefore the common school system capitalized on this belief to further than desire. The education system responded to the needs of the people, but also worked to create social change.

The Shift Toward a Modern Education System

The education system up to this point was still not effective at creating knowledgeable students who were prepared for the future, so the National Education Association (NEA) was formed in 1857 (National Education Association [NEA], n.d.). After previous education models pushed for a universalized education system and the resolution of the civil war freed slaves, the education system now faced an economically and racially diverse student population. To address these changes, the NEA created the "Committee of Ten" to standardize the education experience for all, and provide structure to secondary schools (NEA, 1894, p.34-35). There was a general belief that the majority of students were not going to pursue a college education, and that the purpose of a secondary education is to prepare students for "the duties of life" (NEA, 1894, p. 51).

The organization efforts to make the education system more standardized across the nation led to creating course requirements. The subjects that the committee delegated to secondary schools were languages (Latin, Greek, English, German, French, and Spanish),

mathematics (algebra, geometry, and trigonometry), general history, natural history (astronomy, meteorology, botany, zoology, physiology, and ethnology), physics, and chemistry (NEA, 1894, p.36). The inclusion of electives, as well as the selection of the disciplines listed above closely resembles the curriculum for US high schools in the present day.

Introduction of Standardized Tests (1900s)

When the US entered the World War I in 1917, the demand for soldiers increased, but not everyone was suited for military duty. In order to distinguish the mental capabilities of drafted soldiers and aid officers in assignment, Louis Terman from Stanford University modified a French intelligence test by Alfred Binet and Theodore Simon to a version that was suitable for use in the United States- a test that became popularized as the Stanford-Binet test (Button and Provenzo, 1989, p. 240). After the war was over, partially attributing the victory in 1918 to the skillful placement of soldiers, colleges adopted the intelligence tests to aid admissions decisions (Barker, 1967, p.251).

The College Entrance Examination Board (CEEB), now known as the College Board, formed in 1900, prior to the war, with the main task of streamlining the college admissions process by standardizing school curriculums, and assessing students on the same scale. Carl Brigham, who worked on creating Army IQ tests, was hired by the CEEB to create a standardized test that could be used for entrance to a variety of colleges. Brigham, in 1926, created the mainly multiple-choice Scholastic Aptitude Test (SAT) composed of definitions, arithmetical problems, classification questions, artificial language, antonyms, number series, analogies, logical inference, and paragraph reading (PBS, n.d.).

Prior to the development of the SAT, colleges utilized written examinations developed by the College Board to determine the level of academic achievement each student attained on

certain subjects, but these tests fell out of favor when colleges found that the SAT was a better predictor of college academic performance (Valentine, 1987, p.35). At the present, the SAT is falling out of favor and there is evidence to suggest that the best predictor of college performance in high school performance (Strauss, 2014).

World War II

In 1941, after the bombing of Pearl Harbor, the US joined World War II, and the education system served an important role to promote democracy, similar to the philosophy of schools after the Revolutionary War (Button and Provenzo, 1989, p. 255). During this time, the promotion of democracy took shape by restructuring the curricula to allow for a smoother transition into wartime professions, as well as motivate students to understand and support the war efforts. Schools offered "preintroduction" courses, like radio operation, to lay a foundation of knowledge that would increase the efficacy of military training after students graduate (Garrett, 2006).

The inefficacy of the public education system was observed in the 1940's when army officials noted that many soldiers in training were unable to perform basic math skills. Under the assumption that these trainees learned these skills in public school, their inability to do bookkeeping among other military tasks, was shocking (Klein, 2003). Another cause of concern was the poor reading and writing skills of incoming recruits. Of five million soldiers, a large portion was dismissed because of illiteracy (1940s Education, n.d.). The lack of educational foundation made military training difficult and reinforced the need for "preintroduction" courses (Brandt, 2004).

In addition to the three R's (reading, writing, arithmetic), there was an increased focus on the sciences during the 1940's. Key discoveries in Uranium fission, and nuclear chain reactions

were used toward the creation of a superweapon, the nuclear bomb. Leo Szilard, a Hungarian physicist with a specialized interest in atomic energy, played a role in the creation of the Manhattan Project, and encouraged the US to build a nuclear bomb before the Nazi Germans did (Atomic Heritage Foundation, 2016). In the race towards creating this devastating weapon, the US needed every advantage to stay ahead. As a result, the US emphasized research in physics and engineering during the war (Button and Provenzo, 1989, p. 255).

After the end of World War II, it was clear that returning school-age soldiers were unprepared for academic life. The aptly named Life Adjustment Movement in the late 1940's focused on training these students to become functional members of society and unskilled laborers. Instead of focusing on reading, writing, and arithmetic, the curricula in schools were modified toward social application. For example, courses emphasized communication skills, applied and business mathematics, as well as sciences of everyday life. These modifications contributed to reducing school dropout rates while still providing an accessible form of education for those who were unprepared or unwilling to move on to the college level (High-School Curriculum, 2001). The focus for the education system was to create a moderately educated population so that they are capable of living in a society.

The Mental Competitiveness Scare

The success of creating a population of unskilled laborers and functional citizens following the Life Adjustment Movement was short lived. Involved in the Cold War, the US realized their lack of capable scientists and mathematicians when, in 1957, the Soviet Union launched their first satellite *Sputnik* (Garber, 2007). Knowing that the Soviet Union had developed their own nuclear weapons, the prospect of them controlling space would give them a

greater advantage over the US. A year after *Sputnik* was launched, the US passed the National Defense Education Act (NDEA).

Title III of the NDEA appropriated 70 million dollars to states so that schools would be able to provide education in science and mathematics. There was also an emphasis on learning modern foreign languages, which displaced the traditional Greek and Latin. Schools were able to use these funds to remodel classrooms by adding laboratories, as well as gain "special equipment", like audio-visual materials, that would facilitate teaching those classes (Strengthen the national defense, 1958).

Title V of the NDEA provided additional funds for schools that were able to test secondary school students, and provide appropriate resources for them based on aptitude, ability, and skills. Eligible students who demonstrated great aptitude and ability were placed in programs that would challenge them academically and prepare them to attend institutions of higher education (Strengthen the national defense, 1958). These programs were the beginning of present day gifted and talented programs.

The USSR's accomplishment of launching *Sputnik* also impacted the culture of education in the US where student academic performance was compared to those of students in Soviet countries. The general sentiment at the time was that American students spent too much time "between school and bed drinking sodas with girls" (Onion, 2019). In an effort to refocus students' minds toward academic pursuits, homework, which parents advocated against in the past, was reintroduced (Onion, 2019).

Child-Centered Education

The abrupt refocus on academic subjects that characterized the 1950's lead to a reactionary change in pedagogical methods during the 1960's and 1970's. The previous methods

of memorization and recitation created a population of students that lacked creativity, so American schools followed the British Open Schools Movement to promote active learning. The "open schools" method of teaching resembled the progressive, child-centered approach during the early 1900s where students would learn by discovery- letting their curiosity facilitate their learning. The name "open schools" referred to how classrooms were constructed without walls to promote collaboration and movement for students and teachers. Schools also did not implement a standard curriculum and did not offer standardized tests. Instead, elementary schoolers were able to transition between learning centers, stations set up with subject-specific materials, for them to interact with and direct their own education (Cuban, 2011).

The child-centered approach also spurred the development of alternate schools during the 1960's. Unlike public schools, that had to serve every student using a state-mandated curriculum, alternate schools offered small class sizes, more teacher attention, as well as customized curricula to fit the needs and educational styles of its students (Barr and Parrett, n.d.).

Even though the child-centered approach appealed to many institutions as an alternate method to educate children, there was an observable decline in standardized testing scores in the 1970s that prompted traditionalists to advocate for a "return to basics" teacher-centered approach (Cuban, 2011). The open curricula that many schools pursued contributed to the declining test scores because the lack of structure negatively affected students who were unable to receive basic supplementary instruction at home- leaving them unprepared for content that was being tested in schools (1970s Education, n.d.). The Sandia Report in 1990 re-analyzed SAT scores between 1963 and 1980 and found that scores appeared to decline because there were more minority groups integrating into schools due to civil rights efforts. The reality was that, once scores were separated into subgroups, scores in all groups increased (Ansary, 2007). However,

this report was not made public and the country continued to believe that the education system was failing.

A Nation at Risk: Global Goals

In the 1980s, President Ronald Reagan and the National Commission on Excellence in Education worked to identify the deficits in the education system and propose solutions to make the US globally competitive. In the 1983 report, *A Nation at Risk*, the Commission found that the US, for the past seven years, was outperformed by other countries on international examinations. Additionally, 13% of American 17-year-olds were functionally illiterate, and students were not completing/taking advantage of specialty courses, like Calculus and French, offered in schools. The commission believed that a disorganized, aimless secondary school curriculum was a factor in student nonsuccess, and so introduced educational standards (US Department of Education [USDE], 1999a).

Students in secondary school were required to take 4 years of English, 3 years of mathematics, 3 years of science, 3 years of social studies, and two years of a foreign language if students planned to attend a university. Despite the general course requirements to graduate, secondary education did not move away from vocational training. Since entering the information age in the 1970s, many careers centered around computer programming and development. As a result, President Reagan and the commission also added that students must complete a half year credit of Computer Science to educational standards to prepare them for future careers (USDE, 1999b).

The president and the commission also encouraged the intensification of education through a top-down approach recommending that institutions of higher learning raise their admission requirements to align with the introduced secondary school standards to motivate

schools to follow them. The commission also recommended standardized achievement tests to measure student progress and preparedness to advance to a higher level (USDE, 1999b).

It is important to note that the US experienced a partial change in motivation during the 1950s that lead to the educational changes in the 1980s. After the US broke its isolationist policy prior to WW2 and began to participate in global affairs, the US began to realize the strengths and weaknesses of other countries (Office of the Historian, n.d.). When the Soviets launched *Sputnik*, it indicated a superiority in research and innovation, so the US, in response, strengthened its science and mathematics programs. *A Nation at Risk* confirmed that the US ranked lower than other countries on international standardized tests, so the US worked to reduce the education gap by challenging students using course requirements and homework.

President Reagan, during a speech on April 26, 1983, mentioned that he asked exchange students how the US education system compared to the systems in their respective countries, and was consistently met with laugher- that "they were really having a vacation in our schools" (Reagan Library, 2017). Reagan also noted that the US's unique vision was human progress through individual opportunity, and that by failing to meet educational challenges no progress can be made (Reagan Library, 2017). These remarks display a preservation of internal motivation by asserting that strengthening the education system would serve the nation's individual needs for progress, but also demonstrate an external motivation, to gain respect from other countries, through the anecdote of the laughing exchange students. The US's pressure to perform as a global power transferred directly into the students' pressure to outperform students of other countries.

Age of Reform

The 1990s, within the scope of education, focused on using the foundation laid by *A Nation at Risk* and continuing the push towards educational standards. The expectations for schools in the 1980s were clear, but difficult to accomplish, so President George H.W. Bush, in 1989, invited all the governors to the Charlottesville Education Summit to discuss his goals for education under the title "America 2000". By the year 2000, President Bush wanted the US to rank first in math and science achievement on a global scale, and that student will leave school with competencies in English, math, science, history and geography. This goal of ranking first further demonstrates how America has placed an emphasis on global competitiveness. The goals also indicate the purposes of education: that proper schooling will produce literate, globally competitive, and responsible citizens who are prepared for employment in a modern economy (Klein, 2019).

Despite hosting a summit and creating six goals for America 2000, President Bush's proposal was rejected by Congress. Bush did, however, manage to fund the development for voluntary standards, and laid a foundation for President Clinton, and his son, President George W. Bush, to create their own education policies (Klein, 2019). In 1994, President Clinton's Goals 2000 was passed as the Educate America Act, and largely restated former President Bush's goals for America 2000 with two additional goals for teacher training and parent involvement (National Center for Home Education, 2002). The Educate America Act created councils and boards, like the National Education Standards and Improvement Council, to develop national standards and find methods of identifying student progress. The act also made national standards voluntary for schools to follow and offered incentives to motivate adherence once standards were developed (What is Goals 2000, 1994).

Out of the eight objectives outlined in the Educate America Act, most were unlikely to be met by the year 2000. There were, however, improvements in math and science achievement, and an increase in the high school graduation rate. By 2000, 49 states created standards for English, 49 states created standards for math, 46 states created standards for science, and 46 states created standards for history (Hurst et al., 2003). These standards are a list of skills in a discipline that students were expected to master before graduating high school (Common Core State Standards Initiative [CCSSI], n.d.), and states developed assessments to track student progress and determine if schools were functional (Goals 2000, 2001). These changes, motivated by President Clinton's Educate America Act, added structure to the education system, but did not ensure fulfillment of these standards and goals, instead it further highlighted the needs of the public education system (Goals 2000, 2001).

No Child Left Behind Imposes Standardized Testing (2000s)

The government, trying to meet the academic goals of the past, worked to create policies that would increase standard adherence and student success since the US continued to lag other countries in science and math.

Identifying that the Educate America Act did not have an accountability system in place, President George W. Bush passed the No Child Left Behind Act (NCLBA) in 2002. Title I part A of the NCLBA appropriated funds to schools for improving current programs and establishing new ones, required states to create exams to test skill progression in students and set standards to indicate level of proficiency, and that 95% of students meet the minimum standards for a school to have "Adequate Yearly Progress" (Illinois State Board of Education, 2007). Schools that were unable to meet the set goals were subject to government intervention that ranged from allowing

students to transfer to more successful schools to restructuring the entire institution- replacement of faculty and staff (The Office of the Under Secretary, 2002).

The NCLBA was ultimately labeled a failure due to the number of schools not meeting yearly goals (Strauss, 2018), and forcing "teach-to-the-test" methods into education culture without meeting any of the national goals listed in America 2000 or Goals 2000 (Ladd, 2017). Taking into account the nation's opposition to high-stakes standardized testing, the Every Student Succeeds Act (ESSA) was passed in 2015 under the Obama administration. This act removed the punitive accountability measures that hindered school success, like the Adequate Yearly Progress, and allowed schools to set their own proficiency goals based on their standards. Standardized testing, however, was not eliminated, and progress reports containing score information were still sent to the district and state (A. Lee, 2019).

The Future of Education

The ESSA gave states autonomy over how their education systems will work toward academic growth and success, however, most states adopted the Common Core because it made them eligible for federal grants and other incentives (Greene, 2020). The Trump administration, in 2017, stated that he would work on legislation that "ends Common Core and brings education supervision to local communities", even though the federal government did not create the Common Core and states were already allowed to direct their own education programs through the ESSA (National Public Radio, 2017).

President Trump, after signing the Executive Order on Federalism Education, stated that "previous administrations have wrongfully forced states and schools to comply with federal whims and dictate what our kids are taught. But we know that local communities do it best and know it best. The time has come to empower parents and teachers to make the decisions that help

their students achieve success" (The White House, 2017). Based on the president's statement, the future of education reform is a greater push towards decentralization, and abandonment of national goals of the past.

President George W. Bush advocated for charter and private schools as a solution for students stuck in failing Title I schools so that everyone would be able to receive a quality education (Frontline PBS, 2000). President Trump revived the school choice movement during his administration and labeled public schools as a part of the "American carnage" (Strauss, 2017b). In his budget proposal in 2020, President Trump asked for $5 billion dollars to provide Education Freedom Scholarships, which would pay for students to enroll in schools that would match their educational fit (USDE, 2020). Based on this proposal, there could be a shift towards child-centered practices in the future, but that is yet to be determined as the ESSA remains the current legislation impacting public schools.

Educational Environment in the Present (Until 2020)

What is known about the current education system is that standardized testing continues to be a public-school staple for assessing achievement and "teach to the test" practices are reinforced when students do well on these assessments without deeply interacting with the learning material (a feature of teach to the test methods) (Popham, 2001). There are also concerns about student learning and how public-schools are unable to meet student educational needs- hence the revival of school choice. The shift in focus toward global competitiveness, as introduced by *A Nation at Risk*, has strained the education system because the US has continuously been outranked by other countries on the PISA (Programme for International Student Assessment). In 2018, for instance, the US ranked 11th in reading, 16th in science and 29th in mathematics (Balingit and Van Dam, 2019). The public-education system is a cause of

concern from a domestic and international standpoint, so, if society is dissatisfied with the system, then it must be changed.

Chapter 2: The Gilded Age of Education

"It isn't that they cannot find the solution. It is that they cannot see the problem."
- G.K Chesterton

An education system cannot be static; it must constantly be molded to the needs and aspirations of the society. At the present, the US's educational goal is to produce citizens that are competitive in the global economy and the reforms in place work to increase the competitiveness of students (The White House, n.d.). However, since the implementation of these reforms, enough time has passed to observe that the changes have not been effective and that the US has entered its educational "Gilded Age".

Successes of the Current Education System

The US education system is far from perfect, but its successes should be recognized because it has never regressed- the quality of education in the present is much better than it had been in the past. The child-centered movements of the early 1800s and the 1960s shifted the education system away from rote memorization and more toward understanding concepts (Salmans, 1987). In terms of subject material, instead of solely focusing on reading, writing and arithmetic skills, the high school curriculum evolved to include a variety of subjects including foreign languages and the sciences to promote well-rounded education (US Department of Education [USDE], 1999b).

The US is also among the few countries in the world that educates a diverse population of students- ethnically, culturally, as well as socioeconomically (Kuznia, 2009). Regardless of the heterogeneity among students, there has been a short-term increase in high school graduation rates- indicating less dropouts overall. The Adjusted Cohort Graduation Rate (ACGR) in the US was first measured in 2010, which indicated that 79% of enrolled 9th graders graduated high school in 4 years. In 2016, that value increased to 85% (NCES, 2019). Despite these successes,

there are still many features of the US education system, like teach to the test methods and the emphasis on scores, that prevent students from receiving a meaningful education- these successes are the gild. However, upon closer examination, one would find that even the thin layer of gold has been deteriorating to expose the unimpressive material underneath.

How *A Nation at Risk* and the OECD Made the US Self-Conscious

The United States, since Reagan's *Nation at Risk*, has compared itself to other countries and preoccupied itself with the goal of outranking all other nations in academics. President George H. W. Bush's America 2000 and President Clinton's Goals 2000 both emphasized ranking first in science and mathematics.

In 2000, the first Programme for International Student Assessment (PISA) test was conducted and the results lead to reforms on a national scale (NCES, n.d.[b]). The most recent administration of the PISA was in 2018, and the US was ranked 8th, 29th, and 11th in reading, science and mathematics respectively (Balingit and Van Dam, 2019). For further emphasis on how poorly the US performed, Canada, the US's neighboring country, internationally ranked 6th, 8th and 12th respectively in reading, science and mathematics (Balingit and Van Dam, 2019).

In terms of performance, US students have remained at the same level since the year 2000. Even more shocking is that 20% of American 15-year-olds performed so poorly on the international assessment that it appeared that they have not mastered skills expected of children 5 years younger than them. The US also underperformed in mathematics, specifically below the median, in comparison to other countries (Goldstein, 2019).

Testing the basic competencies of science, reading and mathematics, the PISA scores revealed that the US, although it may be considered a world leader, is supposedly far from leading the world in education. In an attempt to bridge this achievement gap, the education

system focused on widespread high-stakes testing, implementation of standards and, as a result, created the perfect environment for "teach to the test" methods to dominate.

The Problem with State Standardized Testing

Starting in 2002 with the No Child Left Behind Act (NCLBA), the introduction of educational standards led to the development of standardized tests and student performance on these tests, in turn, were used as a metric for school efficacy; schools with low passing rates on these exams were subject to harsh corrective measures.

In addition to preventing harsh accountability measures, the motivation for institutions to ensure that their students had high scores boils down to money. Through the NCLBA, the federal government offered school funding to compliant states and, because there is a positive correlation between money and quality of education and a negative correlation with achievement gaps, states either pressured schools to raise student test scores, or found a way to maneuver around the requirements (Martin et al., 2018).

One method of satisfying the federal government's criteria was through reducing state standards. The Adequate Yearly Progress (AYP) was set by states and the federal government required that 95% of students had to meet AYP state expectations, so some states reduced their expectations to make the 95% goal attainable, not lose funding, and prevent unwanted federal attention (Ladd, 2017). Other states attempted to meet the challenge by maintaining higher expectations. Consequently, schools that wanted to avoid punitive measures by the state spent more instructional hours on English and mathematics and reduced hours for other subjects so that students would perform better on standardized exams (Loveless, 2014). The unequal coverage of subject matter, emphasizing tested subjects, is a "teach to the test" strategy in response to high-stakes testing.

Standardized testing not only impacts schools, but also teacher's careers because teacher performance is largely evaluated based on student test scores. As a result, teachers often default to "teach to the test" methods to quickly improve test scores. Some teachers even avoid certain groups of students, like English language learners (who score lower in general) and gifted students (who consistently score high), so that they would avoid punitive measures, or receive bonuses (Morgan, 2016).

What is Teach to the Test and Why is it Wrong?

Teaching to the test is a strategy where "teachers organize their instruction either around the actual items found on a test or around a set of look-alike items", or, in other words, where teachers cater to the format and content of a test (Popham, 2001). This practice is a source of controversy where some believe that "teach to the test" can be beneficial to students, while others strongly disagree.

Those who promote "teach to the test" argue that if standardized exams assess competency in high-standard concepts then students will be provided a quality education so that they are able to meet those standards (Hansen, 2016). This method is also supported by those who advocate for educational equality because all students are expected to perform well on standardized exams, regardless of race or socioeconomic class, so teaching to the test ensures that disadvantaged groups are not left behind (Ehrenfreund, 2015).

The benefits of "teach to the test" strategies are outweighed by the reality of state examinations. There is still a great disparity between standardized test quality between states and even if states made their exams more challenging there is no guarantee that instructional quality will increase. A 2017 study on the relationship between test preparation and quality of instruction indicated that test preparation is "a significant negative predictor" of ambitious

instruction within the scope of mathematics (Blazar and Pollard, 2017). Although narrow in scope, if generalized, this study indicates that if there is an exam to prepare for, instructors are less likely to use teaching methods that are engaging or choose to venture outside of prescribed material.

This conclusion casts doubt on the assertion that increasing quality of exams would lead to better instruction because the study included districts that had more "cognitively demanding assessments" (free response and short answer questions) meant to reflect higher quality tests and standards, yet the quality of instruction remained the same (Blazar and Pollard, 2017). If further studies expand on the relationship between assessments and instruction quality and arrive at similar conclusions, then "teaching to the test" may not be providing an educational service that is worthy of students' time.

By curating lesson plans to focus on question types or using information from previous standardized exams to increase the likelihood of students scoring high, the resulting test scores do not indicate that the student has mastered a skill, but instead that they know how to master that question type (Popham, 2001). This illusion of success from test scores is most pronounced in disadvantaged groups where the pressure to raise test scores supersedes the general desire to educate.

When faced with a large group of underperforming students, the most efficient way to raise their scores is through rote memorization and recall methods, however, these methods fail to challenge students or help them develop reasoning abilities. The reality is that students are forced to sit through unengaging lessons, receive a low-quality education and are generally unprepared for the future (Morgan, 2016). The achievement gaps between privileged and

disadvantaged groups also, on average, have not reduced, so there is no evidence to support that standardized tests promote education equality (Ehrenfreund, 2015) (Morgan, 2016).

In general, teaching to the test does not allow for students to develop higher level reasoning abilities, like critical thinking, because memorization does not facilitate interaction with the material and this leads to greater disadvantages among students in the future (Morgan, 2016). Some of the benefits of critical thinking is that students will be able to express their ideas clearly, improve their reading comprehension, self-reflect and take charge of their own learning, problem-solve, bridge disciplines to better understand material and apply knowledge in the real world (Islam, 2015). Put simply, when students engage with material and further develop their critical thinking abilities they are better able to understand themselves and the world around them, as well as have the tools to attain more knowledge. "Teach to the test" methods rob students of the opportunity to enhance their abilities for the sake of a test score. Theoretically, if standardized exams assess student mastery of certain concepts, then curriculum-based instruction focused on learning should be enough to earn high scores (Popham, 2001).

Teach to the Test Methods Endorsed by Advanced Placement (AP) Exams

In addition to state-mandated standardized tests, students have the option to take Advanced Placement (AP) exams for college credit. The AP exams and classes, however, are an institutional encouragement of "teach to the test" practices because the purpose of these classes is to prepare the student for the subject-based exam at the end of that term. College Board, the company that created the AP exams, offers resources like course guides, practice exams, section breakdowns and instructor workshops to ensure that teachers can cover all material that will be tested on the exam, as well as teach students strategies to perform well (College Board, 2019). Due to the material being so exam focused, there is little room for in-depth exploration of topics

and critical thinking- similar to the effects of "teach to the test" methods for state examinations (Eight Heads of Washington-Area Private Schools, 2018).

Efficacy of AP Exams

AP exams and classes are supposed to serve as a replacement for introductory college courses, but students have reported that taking the subject-correlated course again in college was beneficial, negating the idea that AP serves as a replacement and that instead it works as a supplement (Duco, 2016). Given that AP classes do not cover material in depth, student understanding of the subject should also be questioned. There is also no evidence to suggest that taking AP exams or enrolling in AP classes has a positive impact on college GPA or college persistence rates- the rate of students who return to college for a second year (Warne, 2017). The real benefit of the AP exam is making college cheaper and possibly graduating earlier by claiming AP credit.

Studies have also shown that there is a positive relationship between AP participation and SAT and ACT scores, or, in other words, students that scored high on AP exams tended to score high on the college entrance examinations (McKillip and Rawls, 2013) (Warne et al., 2015). It should be stated that although many variables were controlled in these studies, like demographics and AP course participation without taking the AP exam, there are some variables, like motivation level of students, that may impact these results. For example, a highly motivated student would want to achieve high scores in both the AP exam and SAT or ACT. This conclusion generally states that preparing for and doing well on one standardized exam relates to performing well on a different standardized exam.

The Problem with the SAT and ACT

College entrance examinations, like the SAT and ACT, are not free from scrutiny on the principle that both are standardized exams that claim to assess a candidate's college readiness by testing skills and competencies that a student should have mastered by the end of their sophomore year of high school (The Princeton Review, n.d.).

Most states follow Common Core standards for instruction, but college entrance exams fail to align what is being taught in schools with what is being tested- indicating that SAT/ACT scores cannot be used as an accurate measure of skill mastery because some of the skills that are being taught are not being tested (Achieve, 2018). This implies that some students who are competent in skills that are not tested on this exam will appear to be incompetent in general and that students who are incompetent in most other skills except the ones that are tested will falsely appear "college ready".

There are many companies, like The Princeton Review and Khan Academy, that focus on test preparation, but if a test is truly an accurate indicator of how well a student mastered high school concepts, then there should be no benefit in taking a preparatory course; high school instruction should be enough. However, based on the findings, a high school education may not be enough to earn a high score on these tests.

The reality is that test-taking strategies can be taught and can increase scores to a degree that makes a difference in college admissions (Strauss, 2017a). This is another instance where "teach to the test" methods improve scores but do not enhance understanding of material. If students can train for tests like the SAT and ACT over a short period of time, then what is the purpose of going to school and actually mastering these concepts?

The revised SAT format that launched in 2016 set to correct these criticisms by making the test more straightforward and making the essay optional- despite writing ability being an important skill that influences college success (Atkinson and Geiser, 2015). There are concerns, however, that this change in the SAT format will make the test easier and that exams like the ACT will be forced to simplify their content in a "race to the bottom" (Bidwell, 2014).

The timed feature of these college entrance exams also penalizes thinking and, instead, rewards quick discernment and guessing- none of which are skills that can prepare the mind for further learning because there is no cognitive effort required to perform these tasks (Atkinson and Geiser, 2015). Furthermore, in regard to predicting college performance and readiness, high school grades (GPA) tend to be better indicators of college success than standardized scores because they can reveal long-term characteristics in students (Strauss, 2014).

Overreliance on Scores

High scores are incredibly valuable and that is why the test preparation and tutoring businesses continue to thrive. For students, higher scores and grades mean access to select colleges or universities and enables them to receive scholarships to buffer the cost of tuition (Fleming, 2019). Scores, in this case, increase educational access. It has also been determined that higher grades can impact earning potential. Students with higher grades had higher revenues among populations that did not attend college. There is also evidence that college-educated individuals had higher revenues than those who did not attend college and the revenue gap between these categories of individuals continues to increase (Marte, 2014).

Outside of the academic world, employers also value scores because high GPAs, to them, indicate technical abilities and job competence, and low GPAs are only considered on a case-by-case basis (Adams, 2015). Some companies view grades as subjective and additionally ask for

SAT scores because, to them, it indicates merit and allows for quick candidate differentiation despite there being no correlation between high GPAs and SAT scores and job performance (Grant, 2014). Therefore, grades and scores can not only influence the level of education a person receives, but also if they are able to gain employment.

By these standards, the US displays meritocratic elements because high scores dictate level of education, which dictate revenue and employment. Although money may not buy happiness, but it can ensure a higher quality of life. By transitive relations, the quality of a student's future depends on the grades they make high school- regardless of whether grades and scores are accurate indicators of intelligence and ability.

The Problem with Grades

Test scores are criticized because coaching and guided instruction can lead to impressive improvement without students learning or understanding the material. High grades, on the other hand, cannot be attained through the same means.

Grades are assigned to give feedback to students on what skills they need to work on, to determine instructional plans (what content to cover) and to motivate students to take an active role in their learning (Marzano, 2000), but now grades appear to be assigned arbitrarily (Guskey, 1994).

There is a general understanding of the difference between an A and a B, but what does it mean when there is a student who has a 90 as a final grade compared to another student with an 89? What does a point difference say about student performance and ability?

A researcher provided a set of grades to 10,000 instructors throughout the world and asked them to give the hypothetical student a final grade, but the returning results ranged from A to F (Strauss, 2009). This indicates that grades are not objective measures of performance and

largely vary between instructors. Grades are also determined by extra credit, deadlines (late assignments tend to receive lower grades), performance of peers (grading by the curve) and inflation (Kuntz, 2012).

The idea that grades will motivate students to work harder and pursue learning has been challenged by a few studies that determined that the promise of a reward often leads to inferior work and reduced interest in learning, challenging tasks and quality of thinking (Marzano, 2000). Students that receive low grades may also internalize their "failure" and believe that there is no way to improve (Guskey, 1994). GPAs are calculated based on grades, but if grades do not demonstrate ability, then GPAs cannot reflect that same assumption- which means that workplaces and colleges are assessing students on inaccurate measures of academic ability. It is this misplaced importance on grades that motivates students to do whatever it takes, like last minute cramming practices, to receive a high grade in lieu of learning material.

The Pressure to Succeed and its Effects

One of the previously mentioned successes of the US education system is that it abandoned memorization-based pedagogy in favor of allowing students to learn through reasoning. However, rote memorization has not been completely eradicated and insidiously lingers until a few days before an examination- this is the practice of cramming.

In an environment where scores dictate a person's future, every grade is important. When the stakes are this high, it is not surprising to see that alternative methods to make high scores often replace the desire to become knowledgeable. Students cram to pass an exam or maintain a certain level of performance, but the outcome is clear; last-minute memorization of material results in a lower percentage of information retained, which means students are not learning the material (Weimer, 2010). By training students to manage their time better and shift educational

emphasis to knowledge acquisition instead of scores, cramming practices can be reduced (Kuntz, 2012).

In addition to creating the perfect environment for students to cram, the increased competition for high-paying jobs and college admissions has led to students taking on a heavier course load consisting of harder classes (Rogers, 2011). High school students in 1990 were taking an average of 23.6 credits, but in 2009 the average amount of credits earned by high schoolers rose to 27.2- an equivalent of 420 extra instructional hours (Koebler, 2011). Being a student in the present age is a lot more challenging than it had been in the past.

These strains, in response to the need to succeed, have negative physiological and academic effects on students. A survey supported by the American Psychological Association found that teenagers in 2014 reported higher levels of stress than surveyed adults especially during the school year and additionally reported feeling depressed, sad, tired and overwhelmed (Bethune, 2014). Extended periods of stress, especially for 9 months repeated annually (the approximate school year), is known to have significant health risks associated. For example, those who experience chronic stress have a greater risk for developing anxiety, depression and heart disease, but also are at a greater risk for experiencing memory and concentration impairment (Mayo Clinic, 2019).

An OECD survey conducted in 2015 indicated that anxiety about school work and tests negatively impacted academic performance in science, mathematics and reading (Pascoe et al., 2020). An additional study indicated that students in secondary school (high school) would experience a spike in cortisol levels, either short or long-term depending on various factors) in response to an academic stressor like declining grades (Lee et al., 2019). These results indicate

that stress can have negative effects on academic performance and that negative academic performance increases the body's stress response- a continuous cycle of harm.

Students that experience negative emotions tend to have lower engagement in school and engagement is necessary for learning and academic achievement (Pascoe et al., 2020). If homework, tests and other seemingly essential aspects of modern-day education are identified as sources of stress for students and if students are unable to learn effectively under stress conditions, then the current system does the opposite of what it intends to do- ultimately doing more damage than good. However, this conclusion does not advocate making schoolwork easy because then there is no opportunity for students to build their skills and learn. Ideally, schools should aim to keep students challenged with a healthy amount of stress to motivate their learning without allowing stress to become so great that the student develops feelings of helplessness or giving up, which is known as the Zone of Proximal Development (McLeod, 2012).

The Problem with Tracking

In a learning environment where scores matter, there is a need to keep up with the pace of school. However, educational disparity is another issue that is prevalent in the US that hinders the success of many individuals. Disadvantaged groups are often left behind, despite enforcement of standardized tests and requirements, that lead to worse outcomes in the future (Hanushek and Woessmann, 2005). The practice of tracking, or early sorting of students based on ability, has increased this disparity by not allowing students on lower track options to develop skills in challenging subject areas. Tracking has also been criticized as a way to segregate public schools, since minorities are often found in lower tracks than the more affluent racial groups (National Association of Secondary School Principals, 2018). However, tracking has gained

support and is common practice since supporters believe it allows students to learn at their appropriate pace and reduces stress for instructors of large classrooms (Kohli and Quartz, 2014).

Based on the supporting reasons, it is reasonable to conclude that tracking gained support because teachers are unable to address student needs on an individual basis due to class size and time constraints, so grouping children by ability level increases educational efficiency with a by-product of increasing the achievement gap as well (Kohli and Quartz, 2014). The later consequences of this practice, in general, is that students who are on the right side of the achievement gap will stream into careers that pay well, while students who are not able to access that same quality of education will stream into lower paying jobs- exacerbating socioeconomic divisions and continuing the cycle of poverty for those in disadvantaged groups.

The US claims to provide equality of opportunity for all students to succeed, but disadvantaged groups are being neglected by the system and, if assigned to a lower track, are funneled into jobs and outcomes that will perpetuate poverty and a lower quality of life. If there was additional support for disadvantaged students, they would be able to keep up with schoolwork and learn at their own pace.

The Problem with Early Specialization

In an effort to promote a passion for learning and secure a career in an increasingly competitive environment, the US education system might encourage students to think about career specialization earlier on. Tracking already exists for students in middle and high schools across the country, in which the main critique is that it facilitates the transition into certain careers based on level of instruction. Under the educational purpose of developing individuals who can participate in a competitive global economy, knowing earlier which career a person

wants to pursue is beneficial because there is more time to "build a resume" and become a more competitive applicant (Salpeter, 2014).

The rise of "career academies", or high schools that promote specialization, is a response to the college and job market competition. Students are encouraged, sometimes required, to choose a major in high school- limiting their elective classes to those that follow the discipline they have chosen for themselves because it encourages student to pursue their passions and gain a meaningful education. Despite the good intentions, the system forces students to make a long-term decision in the 9th grade and makes it difficult to switch to other tracks (Hu, 2007).

Prior to making any decision, it is important to consider all the alternatives before identifying the best one (Guo, 2008). For entering high schoolers, it is unlikely that they have been able to consider the various career paths before making a decision, which is why there are many examples of students who are unhappy with their choice- as exemplified by the high school student who chose a law track only to discover that she had an interest in computers and was unable to switch majors (Hu, 2007). Student interests can change over time, and they have a limited knowledge about careers, so it is not beneficial to make students choose a career early.

Early Specialization Prevents Flexibility

A select few high schools are experimenting with the idea of tracking and specialization, but even then, there are mixed feelings about how these efforts will impact students (Hu, 2007). One concern is that students in high schools will learn one discipline in-depth at the expense of exploring other subject areas. General education offers a range of benefits including critical thinking skills, mental flexibility and problem solving (among others) (The Open University, n.d.), but specialized education allows students to build knowledge in a field that will be frequently used in their careers (Schwartz, 2015).

Although developing career-specific knowledge is important, with the advent of technologies and new fields, the job market is constantly changing. In understanding that employees need to be able to adapt to changes in their specialty field, employers are prioritizing skills like critical thinking and problem solving over subject knowledge (Ryan, 2016). If the US popularizes specialized education in the future, students will be prepared for their future careers, but only if their field is resistant to changes. On the other hand, employees need to be knowledgeable about the field they work in. Take for instance a person who has great communication skills and no in-depth understanding of the law; they may be able to present information, but as a lawyer they will have difficulty performing their job. Expertise is still essential in the job market, but traditional high schools should not make developing this an educational goal.

For students that are career-focused, there already are vocational secondary schools that impart necessary technical skills for certain careers along with general high school requirements (NCES, n.d.[c]). However, there is evidence that salaries of high school graduates are much lower than those of college graduates (Marte, 2014). Additionally, a survey of college freshman indicated that the top three reasons why students go to college is to get a better job, learn about topics of interest and gain specific career training, so it seems redundant to make students specialize in high school and continue specializing in high school (Rampell, 2015).

The benefits of modeling high schools after colleges, in terms of promoting specialization, are unclear since high schools do not offer the same level of instruction that colleges and universities provide. The high schools that are currently experimenting with a specialization system do not claim to completely prepare their students for careers, but instead believe that students on specialty tracks appear more motivated, and therefore more attractive, to

colleges (Hu, 2007). If the goal of a high school education is to get into college and everyone becomes a specialized applicant, and if colleges can only accept a certain number of applicants, then that makes the admissions process more competitive than it was in the past. The solution would be to accommodate more students in colleges, or to accept that there is a hierarchy and that equal opportunity does not lead to equal outcomes, but this topic is beyond the scope of this thesis.

The Problem with Elementary School Specialization (An Extreme Case)

The education system, at the present, has not attempted to force elementary schoolers to choose a career path, however there are efforts to push children into this direction.

Across the country, select medical schools have created pipeline efforts to bring the reality of a healthcare career to elementary school students- a choice motivated by the US's physician shortage and underrepresentation of disadvantaged groups in the healthcare field. Students in these programs are allowed to explore their passion for science through guided instruction- these elementary-schoolers are even taught how to properly perform an intubation (Weiner, 2018). The science instruction offered by these programs will be valuable for these students, but is it useful to be teaching elementary-age children to intubate patients? Are these science classes biased toward health sciences? Analyzing the programs, there is a clear goal to expose students to health careers early and to teach health-related subjects (Cooper Medical School, n.d.) (Weiner, 2018), so students are receiving instruction that is heavily geared towards one area of discipline.

It is important for children to explore multiple disciplines so that they can discover interests and build a sense of self, but young children make career decisions based on fantasy, unlike adolescents who are more likely to base their decisions on reality (Hartung et al., 2005).

By heavily promoting one discipline with strong encouragement to pursue a career in that field, it is reasonable to conclude that young children will want to follow that career- given that they have not explored any other interests that they might be passionate about. In the same way, this could lock students into a decision that may not be the best fit for them. For example, becoming a physician is expensive and time consuming- students must obtain a bachelor's degree, complete the MCAT, apply for schools and complete at least 8 years of training (AAMC, 2019). Telling children that they can become a physician without addressing issues like access to higher education, student resources and application fee waivers will not solve the physician shortage.

Although this example is heavily based on healthcare professions, the ideas presented can be applied to almost any career. The premise of the critique is that unrealistic expectations for the future are encouraged when children are forced to specialize early. The tragedy of this action is that students will find themselves in careers they are not passionate about- whether they were able to pursue their dream and find out it was not the right fit or if they were unable to pursue their dream and had to settle for a different career. Based on this case, it would be unwise to force children to make an uninformed decision about their future when they hardly know their own interests.

Overall Thoughts

While it is comforting to see successes, like the US having a growing graduation rate, and believe that the education system is functioning well, it is important to remember that surface-level successes do not outweigh the problems hidden below. The current methods sacrifice student wellbeing and maintain education inequality for the sake of efficiency. Furthermore, the pressure to succeed in a competitive environment has prompted the education system to experiment with questionable actions, like early specialization, and does not allow students to

learn or make mistakes. Has high school become another hoop to jump through? Until the education system can find direction and address these issues and promote learning, its value will continue to be that of a gold-covered stone- nice to look at but not exceptionally valuable.

Chapter 3: The Purpose of Education

"No one can hit a target with their eyes closed"

- Paulo Coehlo, *The Devil and Miss Prym*

Sitting in the grass and encircling a preacher, there was no question what the colonists in the 1600s hoped to gain from their weekly sermon- knowledge of the Bible and salvation. The same goes for the apprenticed child in the 1700s, astutely watching the town blacksmith so that he could, one day, become as skilled a tradesman and earn an honest living. Now students shuffle into a classroom, but beyond the standardized tests and graded assignments, why are they there?

The past 50 years, for education in the US, have been focused on reform. Starting in the 1980s with Reagan's *Nation at Risk*, the government wanted to revamp the education system and created a list of expectations that addressed becoming mentally competitive with other countries, increasing graduation rates, and scoring better on tests. The following years and succeeding presidents worked to further those same expectations with slight changes.

Although these goals worked well for education as an institution by adding structure and a quantitative way to assess school functionality, none of the changes reflected the needs of students or enhanced their learning experiences; there was no acknowledgement of what students were supposed to gain out of an education.

There are many opinions on what the purpose of education should be and most fall under the categories of career preparation, self-improvement/development and functioning in society. However, the best purpose for education should be able to satisfy all these needs.

Socrates

Starting with classical philosophers and their perspectives on education, Socrates believed that the purpose of education was to regain knowledge and seek out what is true. In accordance with the concept of an immortal soul, once a person is born they lose all previous knowledge and must question and discuss with others to find the truth and re-educate themselves (Mares, 2018).

Following this assertion and applying it to the current education system, Socrates would most likely advocate for active learning through questioning, and that students should develop their own knowledge based on what questions they ask. In practice, this would lead to a student gaining knowledge over a wide range of disciplines and help them understand their surroundings. Therefore Socrates, using modern application, believes that education should focus on gaining knowledge indiscriminately- or to learn. However, there are no education models that could accommodate this outcome because it lacks structure, requires individualized student attention and would be time consuming.

Plato

Unlike Socrates, Plato offers a more constricted purpose for education- that it serves to balance virtues and maintains order in a society. In the *Republic,* through the character Socrates, Plato asserts that people are born with different abilities that allow them to contribute to society and should be sorted into a career path where these abilities can be applied (Santas, 2010, p.10). Education is then used to guide these skilled individuals so that they can perform their jobs (Coumoundouros, n.d.). These individuals, however, will have access to a government-censored education that only further the virtues and skills required of their profession so that social order

can be achieved through the perpetuation of a class system under a philosopher king (Mares, 2018).

Each social class in Plato's *Republic* is associated with a certain virtue; the rulers possess the virtue of wisdom, the military/guardians possess courage, and the artisans and farmers express moderation/self-discipline. The fourth virtue, justice, is then expressed when everyone adheres to their role in society (Pappas, 2013, p.102). Aligning with a tailored education approach, Plato promotes that the purpose of education is to develop the appropriate balance of these virtues so that social roles can be appropriately filled (Mares, 2018).

Applying the underlying ideas of Plato's first purpose of education to the current education system, it can be argued that Plato would advocate for early career-specialization programs. This would involve students being sorted into classes depending on natural inclinations and are then taught only career-relevant course material that would allow them to perform their societal duties. This system would then result in little social mobility, as Plato intended, because roles are fixed at an early age.

Plato's *Republic,* however, describes an ideal/utopian society, and is far from reality. The United States would openly reject efforts that would cause social stagnation. Called the "land of opportunity", the US aims to be a country where people who are willing to work hard can get ahead, therefore early specialization, not to be confused with tracking where students are sorted into streams based on learning abilities, would not align with core American values (US Department of Education, n.d.). Having a focused education would also inhibit a student's ability to bridge disciplines and develop flexibility of thought that many employers look for (Ryan, 2016).

Aristotle

Grappling with the same question of what the purpose of education should be, Aristotle offers three possible solutions: utility of life, excellence, or higher education before stating that there has been no agreement. Despite this conclusion, Aristotle does make one claim in respect to education- that the citizen should be molded to suit the form of government under which he lives (Aristotle, 1984).

The prosperity of the city was important to Aristotle and guided his later thoughts on the purpose of education. To Aristotle, a good city is a result of good citizens, but not necessarily in a moral sense. The city must be filled with people who are able to adhere to and promote civic values above their own because citizens do not belong to themselves, but instead belong to the city (Aristotle, 1984). As a result, Aristotle's education model aims to create these good citizens through the balance of physical, intellectual, and moral education (Mares, 2018). These areas of study do not confer professional skills, but instead enhance how a person experiences life.

Regarding career-specialization and trade skills, Aristotle was not preoccupied with having a focused education like Plato advocated for. The main goal of an Aristotelian education is to develop the characteristics that make a free citizen and found that citizens who learn to serve others are "menial and servile", so a free citizen's education does not prepare them for work (Aristotle, 1984).

In the ideal city, there is a distinction between slaves/vulgar people and free citizens and what they should be learning. The slaves were the ones that built the city and did not participate in its politics, therefore they could only learn trades in service for others- a productive education. Aristotle promoted a practical knowledge for the free citizens so that they could carry out societal roles by knowing how to live and act (Clayton, n.d.).

Aristotle envisioned education to emphasize the balance between the mind, body and soul that would contribute to a well-rounded education. Citizens should also learn by doing, therefore interacting with the learning material and then reinforcing that action with theories to explain the causes (infed.org, 2020). Applying these ideas to the US education system, it can be argued that Aristotle would be an advocate for an interdisciplinary education that allows people to better understand the world around them. Students would be allowed to learn all subjects based on personal interest and strive to become well-rounded, while also learning the core beliefs and laws of their society. Due to Aristotle's opposition to career-specialized learning, students would not gain career skills until after they passed through the public-school system- similar to the current education system where career-specific skills are attained in institutions of higher learning.

Regarding who will take over the roles of the Aristotelian vulgar people/slaves, automation may continue to take over industries and replace human workers (Reeve, 2019). One criticism of the good citizen goal is that the US is an individualistic society where the promotion of personal goals outweighs the promotion of societal ones and Aristotle's ideas work best in an ideal collectivistic society which is not the US.

John Locke and Jean Jacques Rousseau

With the benefit of living in advanced societies almost a thousand years later, the Enlightenment thinkers, who were influenced by the classic philosophers, offered their own interpretation of what the purpose of education should be. John Locke's view is that the goal of education is to produce people who are of sound mind and body- a virtuous man. This virtuous man is then able to use reason and morals to ensure the stability of society, similar to Aristotle's good citizen (Androne, 2014). This view supports that the purpose of education is for becoming a functional citizen in society. Put simply, developing the individual self will ensure the success

of society, but one criticism is that knowing oneself does not pass on talents or skills that could help them in a profession. This criticism does not advocate for vocational education, but a sound mind requires more than instruction in virtue. Locke does not completely discount the importance of wisdom and learning, but the greater emphasis is on developing morality.

Rousseau's purposes of education were expressed in his book Émile, and how educational goals changed as the boy Émile moved through different age stages. The main takeaway from this work was that the aim of education is to prepare for manhood (or generally adulthood), to live in accord with nature, and learn to live well (fundamental goal of happiness). However, man cannot simply live under nature's laws because they are a part of civilization, so Rousseau adds that the other purpose of education is to promote socialization, learn the knowledge of the past and present and assume responsibility for the common good as a patriotic citizen (Collins, 1976).

The overall conclusion here is that the continuation and welfare of society plays a large role in the education of an individual in that becoming a good citizen is preferred over becoming a good or even knowledgeable person. However, most philosophers include the goal of self-improvement within the goal of becoming a good citizen because moral, physical and intellectual development are recommended. Rousseau differs from the previous philosophers by segregating self-improvement (preparation for manhood) from becoming a good citizen, maintaining that education can have different purposes at different points of a child's life- this is best understood through Émile as he is guided using a naturalistic education (following his nature) when he is younger, but then learns the skills needed to function in society when he is older (Collins, 1976).

Ralph Waldo Emerson

Just like Rousseau's goals for young Émile, Emerson believed that the aim of education was "a moral one; to teach self-trust; to inspire the youthful man with an interest in himself; with a curiosity touching his own nature; to acquaint him with the resources of his mind, and to teach him that there is all his strength" (Bosco et al., 2005, p.48). This would focus on individual development, including the abilities to think and reason, which in turn would give them the courage to question people in power and improve society (Williamson and Null, 2008).

Emerson's aim for education, so far, is the most implementable in the US. Not only does he advocate for learning about oneself, but also to learn about the resources of one's mind. By teaching children how to think and reason they are able to develop their own beliefs, question the beliefs of others, direct their own learning and use these abilities to solve problems and improve their society (Islam, 2015). The ability to critical think and be mentally flexible are skills that are desirable in the professional world, so developing these reasoning abilities will also satisfy the goal of career preparation (Ryan, 2016).

John Dewey

John Dewey critiques the educational aims proposed by Rousseau, in that natural development cannot be an educational aim because then it negates education itself- if it is natural it does not need to be learned. Dewey also states that leaving children to their own devices is not going to promote spontaneous development- students need a social environment so that their abilities and skills can develop. Writing during the progressive movement, Dewey asserts that the purpose of education is to "correct unfair privilege and unfair deprivation", or promote equality (Mintz, 2017).

Dewey also rejects the idea of promoting the common good over individual interest. Instead, Dewey says society would benefit more when educated people are able to address societal needs by filling roles they are best suited for. The benefit of a broad education instead of a specialized education is that people can see "broader scientific, economic, and cultural effects of their work…[and] adapt to new inventions, new ideas, and new needs". Education enables flexibility of mind that specialized education does not provide, so career preparation should not be the goal of education (Mintz, 2017).

Another aim for education is to study the past so that it can be applied to the present, motivating students to be able to solve societal problems by reflecting on past mistakes or solutions and using those insights to make progress in their present lives (Mintz, 2017).

Overall, Dewey suggests that the goal of the American education system should be to encourage equality, gain a broad understanding of the world, and to have flexibility of thought so that there can be novel approaches to addressing the needs of society. These aims align with the American core beliefs of individual opportunity and equality, which, if applied to the current education system, would not require the country to undergo culture shift- unlike the other goals that subtly (or not so subtly) endorse collectivism.

Dewey's ideas combine the best of Emerson's views on education and adds the purpose of correcting inequality, which is exactly what the US wants to do- provide equal opportunities for all students. By focusing on developing mental flexibility, students in the US would be able to satisfy personal development, learn to function in society and prepare for future careers and learning.

Alfred North Whitehead

In an essay titled *The Aims of Education*, Alfred North Whitehead stated that "education is the acquisition of the art of the utilisation of knowledge" or that the purpose of learning is to be able to apply the concepts you learned. Learning facts and skills without knowing how to apply them were called "inert ideas" and are, according to Whitehead, useless and harmful (Whitehead, 2007). Education deals with human minds, so students should be able to engage their curiosity, judgement and power to master difficult disciplines (Whitehead, 2007). This view aligns with the previous philosophers who promoted reasoning, like Dewey and Emerson, so that the mind would be well equipped to understand the world and the concept of self.

Whitehead, in his work *The Function of Reason*, discusses the two aspects related to reasoning: that reasoning allows clarification and discovery of methodologies and the possibilities of their use, and reasoning seeks to gain an understanding of the world (Whitehead, 1929, p.37-38). In developing students with reasoning abilities, it would satisfy society's desire for education to help students discover their interests and beliefs, to understand the world better and be able to learn different methodologies/disciplines and apply them to improve the society. The ability to reason, therefore, gains further support as an umbrella goal that, when pursued, furthers the ends of other smaller educational goals.

Shifts in Goals Over Time

In 1918, the Commission on the Reorganization of Secondary Education (CRSE) published the "Cardinal Principles on Secondary Education" in which it outlined seven objectives for students to gain out of a secondary education: health, command of fundamental processes (reading, writing, arithmetic, and speech), home membership, vocation (a career), citizenship (how be a member of society), worthy use of leisure (to discover non-career

interests), and ethical character or developing morals in a democratic society (National Education Association, 1970).

The progressives/ child-centered education advocates, like Dewey, opposed career-specific instruction (vocational education) and traditional (memorization-based) education (Reese, 2001). However, the objectives outlined in the report served to organize secondary schools and guided curricular instruction. Although the cardinal principles promoted a continuation of the traditional education system (that the progressives opposed), the objectives integrated progressive aims like the growth of character and leisure (Wraga, 2010). Decades later, during the curriculum-building movement of the 1940s, disputes over educational purpose did not stray from the points made by original philosophers, and the purposes of education continued to follow along the same principles in the 1918 report. To the dismay of many progressives, it became unrealistic to provide individualized instruction to support the objective of individual development and schools then became modes of mass education for the sake of convenience and conformity (Schubert et al., 2002).

The current education system in the US, departing from a memorization-based system yet conserving the general education practices of the 1940s, transformed into a test-based system. As one contemporary education philosopher reflects, "we've reduced our definition of human development and achievement—that miraculous growth of intelligence, sensibility, and the discovery of the world—to a test score" (Laverty and Gregory, 2010).The constant test preparation is viewed as a consequence of treating students like "economic indicators" as the purpose of the US education system (and education systems outside of the US) shifts toward making students economically competitive so that they are able to successfully pursue an "unexamined desire in a free-market economy" (Laverty and Gregory, 2010).

Continued Debate Over Purpose of Education

Asking adults who know education best, parents and teachers, the question of what the purpose of education should be led to varied results. From the 2019 PDK Poll, a poll that assesses the public's attitudes towards the public education system, results indicate that 53% of K-12 parents think the purpose of schools should be academic preparation, while 45% and 37% of teachers think the purpose of school should be to prepare students to be good citizens and to be academically prepared respectively (PDK Poll, 2019).

Less than 20% of both parents and teachers believe that the purpose of education should be to prepare students for work (PDK Poll, 2019). The one downside of this survey question is that parents and teachers were only able to choose between "to prepare students academically, to prepare students for work, or to prepare students to be good citizens" as answer choices; consequently, it is possible that parents and teachers might hold a different belief on the purpose of education but were limited in their responses. Despite this possible outcome, there is still clear evidence that parents and teachers are not on the same page on the purpose of education.

Is There One Purpose?

The US's education goals often changed in response to the goals of society. For example, after the Revolutionary War the goal of education was to prepare students for life in a democratic society, and how, after the Industrial Revolution, the goal was to prepare workers for careers in industry (Sloan, 2012). For the past fifty years, the US has been locked in a mental competition with other countries, and the Trump administration, in response, stated that the goal of education is to prepare students to compete in a global economy (The White House, n.d.).

Even though the government has taken a stance on the focus of education, there are still multiple opinions from the public that often go beyond work, academic and social preparation.

Some of these different perspectives include education being used to gain the knowledge of subject matter being taught (no larger implications), gain confidence (to apply skills to the real world) like Emerson advocated for and even learn how to learn (Kelly, 2020). Regardless of these multiple views, a "to each their own" attitude has been adopted since reaching a consensus would be difficult to achieve (Sloan, 2012).

Education reflects society's beliefs and needs, so an investigation of the US's core beliefs would easily provide an answer for what the purpose of education should be. That being stated, the underlying assumption would then be that the purpose of education is to create a good citizen, which has been a point of contention for both contemporary reformers of education and philosophers of the past. There remain two options: pursue one aim that will lead to consequential benefits in all areas of expressed importance or pursue multiple aims.

In Defense of Reasoning

The seven cardinal principles proposed in 1918 can be distilled down to three areas of improvement: self, intelligence, and society. By improving aspects of the self, like understanding morals, exploring interests, and gaining confidence to ask questions, these skills can impact development in other areas. Continuing with the example, by gaining the confidence to ask questions, a person can interact with intellectual material on a deeper level using critical thinking. By understanding morals, a person is better able to act like a citizen in society, and by exploring interests a person can develop a passion for a skill or topic that can be implemented as a service to society (work preparation) (Strauss, 2015).

The three-areas model works well assuming that skills developed in each of these areas will be extended to increase development in other areas, but there is another option that could

further distill the three-areas model into one overarching goal for education. “The most significant skill [young people] can develop is… a mind equipped to think” (Sloan, 2012).

There are reservations against training students to think, mainly because thinking is a process that confers indirect benefits versus direct benefits- like gaining marketable skills or passing a standardized exam. The apprehension to support this goal stems from the reality that people have “reduced the definition of human development- the growth of intelligence, sensibility, and the discovery of the world to a test score” (Laverty and Gregory, 2010). The most effective method of learning new material is to actively engage with it. By making lessons more interactive, encouraging students to ask questions and think deeply about the material, there is a three-part benefit: that the student gains a better understanding of the lesson, is able to develop critical thinking skills, and gain creative flexibility (Taylor, 2016).

Plato was among the many past philosophers to support the development of a reasoning mind, but he only endorsed this education style for people who were capable and dependent on it to perform their societal roles; so, the quality and content of an individual’s education was based on their class (Mares, 2018). The concern then shifts to the class system in the present- would it be possible for students from lower socioeconomic statuses, or disadvantaged backgrounds to benefit from this learning style? The short answer is yes. Socrates, the originator of the dialectic method, was able to teach a slave-boy geometry despite the boy not having any mathematical prior knowledge but this required individualized attention and time (Taylor, 2016).

A study done by Philosophy for Children is a modern example of how disadvantaged groups can benefit from reasoning-based learning. This program was launched in the United Kingdom (UK) to help children in English primary schools gain higher order thinking skills- asking questions, creating arguments and engaging in debate. Although this project has not

entered the second phase of testing, the preliminary results show that children participating in the program were two months ahead in math and reading compared to other students. However, using a cognitive abilities test (not focused on attainment of skills), there was a smaller positive outcome, meaning that benefits were visible, but not to the same degree. The study also determined that the program had a positive impact on disadvantaged students, from an attainment perspective, and a smaller positive impact in cognitive ability scores (EEF Projects, 2019). The takeaway is that a program that pushes thinking skills has not resulted in stagnation or regression in learning and was beneficial to both disadvantaged and advantaged students.

Addressing the concern on career preparation, as the job market becomes more competitive, companies and other workplaces are looking beyond strict requirements and certifications. Industries are constantly affected by new societal needs and innovations, so the emphasis is no longer on training, but soft-skills. Employers are more likely to hire individuals who demonstrate passion for their career (know and pursue their interests), enjoy learning new things, can think independently and are able to problem-solve (Ryan, 2016). By encouraging students to reason and develop a flexible mind, they are not only able to understand traditional subject material, but they also are able to exercise their creativity, problem-solve, evaluate information and discover their interests- all of which have direct benefits in the job market (Rymanowicz, 2018).

Closing Commentary

Instead of focusing on career preparation and increasing the nation's economic power, education should promote a passion for learning and growing the mind. So, in the end, what qualities should a student possess? After completing thirteen years of public instruction, students should have the tools necessary to develop their lives in society, their careers, as well as their

individual selves, but the first step is to develop reasoning abilities and teach students how to use the powerful resources of their mind.

Chapter 4: Searching for Inspiration

"To be yourself in a world that is constantly trying to make you something else is the greatest accomplishment."
- Ralph Waldo Emerson

In the same way that each person is different from another person, countries are distinct from one another. The US has distinct cultural values and a heterogenous population that isolates most of its practices and views from the rest of the world. Among the many solutions proposed to fix the present education system was to directly borrow the methods other, more "educationally successful", countries use and implement them. However, what works best in one country does not always work in other countries. By analyzing cultural differences, qualities of the respective education systems and student experiences within these systems, the US can draw inspiration from their practices and guide its own reforms based on its unique needs.

The PISA Exam

Despite decades of work to improve the US education system, the results of the 2018 PISA examination disappointed the country when the US internationally ranked 8th in reading, an alarming 29th in mathematics and 11th in science (Balingit and Van Dam, 2019). To add insult to injury, the OECD reported that there was no significant improvement or decline in the US's performance- that the US has been scoring the same way it has been between the years 2000 and 2006 (OECD, 2018[c]).

Standardized test scores rarely appear to be an appropriate measure of determining student success and mastery, as determined by the critique of US standardized tests in previous chapters. However, the PISA exam, unlike other standardized tests, is a product of international collaboration between students, parents, teachers, education leaders, governments, experts and

institutions to create an examination that is internationally relevant with high validity (Ouyang, 2016).

The PISA exam is composed of multiple choice, open response and multiple answer (checkboxes) questions aimed toward determining if students can apply their skills and knowledge in science, reading, mathematics, financial literacy and collaborative problem-solving (NCES, n.d.[a]).

This test is also resistant to rewarding countries with good test taking skills, as evidenced by Finland, which was the top country in the world in 2006 with academic standings almost equivalent to Singapore's in 2015 (Anderson and Wang, 2016). Finland is a country that does not rely heavily on tests, notably having only one major test at the end of their secondary education, and are still capable of doing well on PISA exams (Dickinson, 2019[a]). In 2018, Finland ranked 6th in reading, 6th in science and 15th in mathematics, outperforming the test-heavy US (Balingit and Van Dam, 2019). This result indicates that if a student has mastery of a skill, they will do well on exams regardless of exposure to testing format.

The Flaws of PISA

Although the OECD claims that the PISA exam is an international assessment that can accurately gauge student mastery of essential skills and determine the efficacy of education systems, it has recently been criticized.

The PISA exam is accused of having a narrow focus of the purpose of education- to prepare students for economic participation. PISA neglects other subjects that schools focus on, like history and humanities, yet attempts to determine the overall quality of an education system on three subjects. The exam does not accommodate cultural differences between societies

because it assumes that there is one universal set of skills that are valuable in all countries, which promotes an unrealistic homogenization of education throughout the world (Zhao, 2020).

Of interest to the US, the PISA claims that there is a strong relationship between high-scoring students and a country's economic growth, however these claims were proven false when test scores and subsequent periods of economic growth resulted in no strong relationship. Therefore, the test cannot predict a relationship between performing well and being economically successful. When the PISA is based on illusory claims of educational and economic superiority based on how well a country performs on the test, why does the US still focus on their ranking?

Instead of looking at the PISA exam as the deciding metric for educational efficacy, it can still be used to determine how well students are able to apply mathematic, reading and science knowledge. If a student has a clear understanding of a topic/ mastered a certain skill, they should succeed in any assessment targeting those skills. Therefore, the results of the PISA should be viewed as how well a student has mastered the concepts that are being tested and not as an indicator educational superiority.

In general, a good education system will develop competencies in students that would lead to success on examinations like the PISA, but focus should be on improving the student and not on scoring high on these exams. Additionally, cultural differences result in variations on what skills societies find valuable, as a result each education system fits the needs of its own community and if it is effective in that context, there is no value in comparing that education system with other countries' systems. In the case of education, international rankings/ an educational hierarchy should be abandoned and a "to each their own" mindset should be adopted.

Singapore's Education System

In 2015, Singapore was the highest scoring country in reading, mathematics and science, however their educational model opposes the underlying cultural beliefs of the US (Dickinson, 2019[b]). At the end of primary school, Singaporean children take the Primary School Leaving Exam (PSLE) to determine their stream in secondary school. This exam separates students into one of four tracks: special, express, normal academic, and normal technical. Students on the special track receive an accelerated education that results in attending a university, while students on the normal technical track tend to stream into trade jobs- similar to the US equivalent of vocational schools (Jelita, 2017).

The concerns against streaming, or tracking, echo the sentiments of the US in that it serves to limit educational and vocational opportunity for students earlier and promotes inequality. Singaporean schools closely follow Chinese educational practices where instruction is largely memorization and test-based, which creates a high stress environment that forces peer competition and does not promote critical thinking or problem-solving skills (Jelita, 2017).

Teacher's lessons in Singapore are heavily scripted and "teach to the test methods" are often used. Students use textbooks, worksheets and spend a lot of time practicing with drills. In this model of education, the teacher is the source of knowledge and is tasked with transmitting it to students efficiently, therefore there is little classroom discussion over topics. When correcting drills, teachers are not interested in the process of how a student arrived at an answer, but only if it is correct or incorrect (Hogan, 2014).

Singapore's View on Streaming

A western reflection on streaming, based on statements from Singapore's Ministry of Education, is overwhelmingly positive claiming that this model of education promotes equity.

According to the National Center on Education and the Economy (NCEE), Singapore's streaming model allows students to learn at their own pace, but that the same core standards are expected of students in all streams. There is also opportunity for students to move to a different stream based on their demonstrated abilities- a student can move to a higher stream in a certain subject if they show aptitude. The Ministry also asserts that there is no stigmatization between tracks, citing the careful naming to ensure that the categories are not "basic and advanced", but instead are "normal and special" (Driskell, 2016).

Contrary to the western take, the South China Morning Post, a news outlet that shares insights and developments of China and other Asian countries, had a complete opposite reaction to Singapore's streaming system stating that families enrolled their primary schoolers in extracurricular tuition so that they will perform better on the PSLE and get sorted into a higher stream (Jelita, 2017). If there was equality in learning objectives and no stigmatization, there would not be such a pressure to join the special and express streams.

In 2019, the Ministry of Education stated that by 2024 there will be no streaming and that subject-based banding will replace the previous system. In explaining the motivation for the systemic change, it countered all claims of equity and efficacy that previous sources endorsed. Subject-based banding offers three levels of instruction general 1 (G1), 2 (G2) and 3 (G3), which replace, respectively, the normal technical, normal academic and normal express streams. By allowing students to take subjects at different levels (mix and match to promote personalized learning), this would remedy the issue of students being fixed to one track- directly opposing the previous conception of flexibility between streams. Another motivation for these changes is to decrease stigma, although there are concerns that students taking more G1 courses will be stigmatized in the same way, which also counters the conception that there is no perception of

hierarchy between streams. In terms of secondary school sorting, there is no change in principle for admissions, it is still relying on the three-stream model, so categorization of students will persist (Chua, 2019).

General Culture of Singapore

This high stress environment within a Singaporean education system might be attributed to culture-specific expectations for children. In general, Asian cultures experience a huge amount of academic pressure to succeed from parents and the traditional culture emphasizes an obligation to family (Nishi, 2012).

Due to Singapore being a collectivist society, the family unit is more powerful than the individual, so the wishes of the family are respected. The observance of filial piety in Singapore (and other eastern countries) also necessitates that children should be able to care for their elders, increasing the pressure to maximize the success and income of the family unit (Evason, 2015). Students have a greater incentive to achieve academic success in the meritocratic society because better jobs lead to better incomes, which in turn ensures that they can care for their family members within a multi-generational family model. Singapore is also a multicultural country, where Chinese, Malay and Indians make up the majority of inhabitants, but due to similar collectivist backgrounds these different cultures may increase competition within the education system and offer challenges through different learning practices (National Population and Talent Division, 2014). However, the cultural diversity in Singapore does not compare to the level of diversity found in the US (Keating and Karklis, 2016).

Mental Health of Singapore's Students

The pressure to succeed academically has had a physical toll on Singaporean students and is likely to continue in the future. In 2015, there were 27 suicides reported for children between

the ages of 10 and 19; one notable case is of an 11-year-old who jumped from the 17th floor of an apartment because he was afraid to show his parents his failing exam results (Jelita, 2017).

According to the PISA result of levels of schoolwork-related anxiety, Singapore's anxiety index was a 0.57, competitive with China's index of 0.6, while the OECD average is 0.01 for all 15-year-olds tested (OECD, 2017). High levels of anxiety and depression prevent effective learning (Mayo Clinic, 2019) but because Singaporean culture does not emphasize traits of the individual, it is possible that learning for self-improvement is outweighed by commitment to family and schoolwork anxiety is just a part of adhering to cultural values.

Considering that Singapore is unlikely to abandon collectivistic beliefs and that the education system still promotes competition by maintaining a hierarchy it is unlikely that anxiety levels in students will decrease.

Finland's Education System

Academic success and student welfare do not have to be independent of each other- where a student must choose one over the other. In 2006, Finland was ranked at the top with scores comparable to Singapore's in 2015 (Anderson and Wang, 2016). Finland, however, strives to maintain child-centered practices and does not see the value in heavy testing (Dickinson, 2019a).

There is only one exam that is administered in Finland, the Finnish Matriculation Exam, and it is taken toward the end of upper secondary school as a graduation exam to earn a certificate and demonstrates ability to move on to university or vocational schools. Students are required to complete four exams total, one mother tongue exam and three other tests from a list of compulsory subjects that students can pick from (Ministry of Education and Culture, n.d.).

These exams are also free response and essay based, which demonstrates students' understanding of the material (NCEE, n.d.).

Unlike in Singapore, which uses T-scores to show how students performed relative to their peers (Chau, 2019), there is no such practice in Finland (Hancock, 2011). Finns can learn in a non-competitive environment since the largest source of competition, test-scores, are not used to assess students until graduation (end of compulsory education). Students and teachers are also given 15-20 minutes between classes to refresh themselves, eat a snack or play (students), which also adds to the low-stress environment that schools in Finland maintain (Colagrossi, 2018).

In terms of methods, there have been rumors that Finland would radically stop teaching students according to subjects and that the phenomenon-based learning model would throw curricula out the window. Needless to say, the rumors are false. Finland has not ousted school subjects and phenomenon-based learning has a smaller, but still significant, role in the reformed curricula (Sahlberg, 2015).

Finland has a national core curriculum in combination with local curricula that all schools follow, but teachers have the freedom to plan their own lessons, and, more recently, have begun to teach lessons that bridge multiple disciplines, investigate daily phenomena and technology.

Schools are required to teach a multidisciplinary learning module at least once per school year. These modules will allow students to recognize connections between different subjects and how those interactions lead to a greater understanding of a topic- this is how phenomenon-based learning will be implemented in Finland (Sahlberg, 2015).

Students have the same teacher for grades 1-6 and teachers, as a result, are better able to adjust their teaching approaches to suit the needs of the child. In grades 7-9 students receive instruction from teachers who are specialized in the subject they teach, which ensures that

students learn material effectively and accurately. The overall goal for students in grades 1-9 is to learn to think for themselves and direct their own learning, which largely echoes the sentiments of education philosophers on the real goal of education (infoFinland.fi, 2019[b]). Students also work collaboratively on interdisciplinary projects that they design and are encouraged to learn by doing (NCEE, n.d.).

In secondary school, there is a focus on general education building off the same subjects taught in grades 1-9, but material is more in-depth, and students are more autonomous over their learning (infoFinland.fi, 2019[b]). In the last two years of their upper secondary education students create an education plan and finish it at their own pace. In terms of specialization, some Finnish upper secondary schools are focused on certain disciplines, so students who wish to be proficient in a certain area can choose to attend specialized schools versus general upper secondary programs (NCEE, n.d.).

Finland ensures that students receive the best instruction from their teachers and that they are able to take an active role in their own education. There is also special attention to bridging disciplines and understanding the world so that students can learn to think for themselves and make connections.

General Culture of Finland

Finland is an individualistic society like the US and unlike Singapore, which means the development, needs and advancement of the individual is favored over those of the country (infoFinland, 2019[a]). According to the population statistics in 2018, about 7.3% of the population in Finland has an immigrant background mainly from Russia and Estonia, so 94.7% of the population has a Finnish background- indicating a largely homogenous society (Statistics Finland, 2018).

The Finns uphold the values of equality and trust between people, privacy, modesty and trust in authority (infoFinland, 2019[a]). It is this trust in authority and people, as well as belief in equality, that allows Finland to offer social services like universal healthcare, paid parental leave, tuition-free college among other benefits that are funded by high taxes (Partanen and Corson, 2019). Finland, in general, works to ensure that citizen needs are satisfied.

Mental Health of Finland's Students

Schools cater to student wellbeing by also having a later class start time. In Finland, classes start between 9 and 9:45am (Colagrossi, 2018), while in Singapore class usually starts at around 7:30am- almost an hour and a half earlier (Oxford University Press, 2018). The US, on average, starts classes at 8am, but results in students not receiving the proper amount of sleep (Rettner, 2015). Sleep deficits lead to poor health outcomes like increased risk for mental health problems, lower academic performance and increased fatigue, which is prevented with Finland's later start time (Wheaton et al., 2016).

Finland's focus on student well-being and learning is demonstrated by the 2015 PISA results. Singapore's schoolwork-anxiety index was 0.57 and the US's index measure was 0.19, but Finland's index was far lower at -0.41, indicating that Finns do not experience schoolwork-related anxiety to the extent that the other countries do (OECD, 2017). Singapore did not participate in the student life satisfaction score, but the US scored 7.4/10 on average life satisfaction and Finland scored 7.9/10 (OECD, 2017). Based on these results, it appears that15-year-olds in Finland are more satisfied than 15-year-olds in Singapore and the US.

Problems in Finland: Homogeneity and Changes

Unlike Singapore and the US, Finland is ethnically homogenous (World Population Review, n.d.) where 7.3% of the population has an immigrant background (Eurydice, 2020). Increased immigration has placed a burden on schools where more students require special preparation classes separate from other children.

There are also positive discrimination funds so that schools can afford to pay specialist teachers for immigrant students. Additionally, there is negative discrimination, in which parents are choosing to enroll their students in more homogenous schools where there are less immigrant children (Hancock, 2011).

According to a study in 2019, about 25% of students have been discriminated against or bullied, and about 50% believe that discrimination is widespread in Finland. There was also a clear link between discrimination and dislike of school, which could change the environment of Finnish schools where students do not want to actively participate or learn if schools do not find a way to promote sensitivity and inclusivity (Zacheus et al., 2019).

Problems in Finland: Ambition

Another concern about the Finnish education system is that it is not ambitious enough. Students do not practice developing their knowledge and skills for long periods of time because instructional time is short and there are frequent breaks. There is also the argument that standards in Finland are lower than in Asian countries and that student gratification from fun learning activities may be disadvantageous when students need to learn for future benefits (Dickinson, 2019[b]). This concern carries weight when Finnish teachers are worried about students who choose a path and drop out when they are not successful. These students are a cause for concern

because “some are a drain on the socialist system [and]… that in 5-10 years this may become unsustainable” (Searls, 2017).

There are benefits and drawbacks to having a competitive versus non-competitive education system but based on Singapore’s schoolwork anxiety index and cases of suicide, combined with the high pressure to succeed, just because a system works does not mean it is in a person’s best interest.

The same can be said for a non-competitive system like Finland’s, while student happiness is important, if there is no motivation to learn and succeed for delayed gratification, people will not be able to maximize their potential and will be stuck in careers they are not passionate about. If these practices are taken to the extreme, then the economy could collapse.

Cross-Cultural Analysis: Values

The differences between the US and Finland are boiled down to how far ideology is practiced in respective countries. Finland has a system of social support funded by taxes, which offers universal healthcare and paid parental leave to its citizens, and although both countries are individualist, the US belief of self-sufficiency prevents initiatives for the greater good from passing. For example, Americans believe that if a person needs healthcare they should be able to pay for it by themselves instead of relying on other people to pay for them- this is self-sufficiency in practice (Cherry, 2020).

The US pays lower taxes compared to many other countries (Tax Policy Center. n.d.) and the general distrust of government and its efficacy does not incentivize people to invest in social programs (Niskanen Center, 2019). This distrust of government also inhibits centralization of the US education system. Finland, on the other hand, trusts authority based on cultural values.

American values, similar to the Finn's are equality, privacy and individualism, however, the US also values time, self-help, competition and future-orientation (Kohls, 1984). This is not to say that the Finns do not express these values in their society, but that the US prioritizes these values more.

Focusing on competition and self-help, the idea is that every person is responsible for bettering themselves, an "every man for himself" attitude, which reduces the possibility of extended collaboration, as the Finns practice, in classrooms. Each person is an isolated unit loosely held together by ties to their community and the ultimate goal is personal success.

Singapore, being a collectivist society, has a slightly different set of cultural values as briefly explained. Mainly resilience, responsibility and integrity, which includes equal opportunity and meritocracy, are important values that shape a Singaporean student's approach to education (National Integration Council, 2019). Equality of opportunity is one value that is common amongst all three countries, but the system of meritocracy in Singapore, as it is with many Asian countries, directs the competition in schools.

The value of responsibility is expanded as an individual's responsibility to themselves, their family, their community, their country and the world (National Integration Council, 2019). There is a bottom-up effect where if individuals improve themselves, they are better able to provide for themselves and their family, which results in them not being a burden to their community. Just like how the weakest link in a chain determines the strength of the chain, the stability of each individual determines the stability of society as a whole.

Cross-Cultural Analysis: Teacher Role in Society

In Finland, teaching is also a highly respected profession. Based on the educational goal of providing quality education to all students and further the cultural value of equality, teachers

go through many years of schooling so that they are not only knowledgeable about learning material, but can also practice different methods of learning to best suit various subjects and students (Crouch, 2015).

To teach in Finland, individuals are required to have a master's degree (Colagrossi, 2018). The high level of education expected from teachers results in the education system trusting teachers to educate students appropriately-without using standardized tests as performance indicators. Teachers that receive more education, for example those with graduate degrees, are paid more and can work with students with special academic and behavioral needs (Hancock, 2011). Teachers also collaborate with one another so that individual strengths serve a larger group of students and balance out individual weaknesses (Hancock, 2011).

In Finland there is a sake of learning, for learning's sake. Granted there are societal and individual benefits from gaining an education, but the emphasis on transmitting and interacting with information in new and effective ways is where the Finnish education system succeeds.

In terms of teaching, Singapore teachers consider it an important social responsibility because the goal is to make students economically useful to society. As one teacher said, "teachers are like a candle, they burn themselves to light others" (Kaur and Noman, 2015).There is a desire for students to develop a love of learning, so some practices like complete obedience to authority are replaced with friendly teacher-student relationships and giving students some choice in learning materials by younger teachers (less than 30 years of age) (Kaur and Noman, 2015).

In the US, teachers are underpaid and generally constrained by curricula and standards to be able to creatively educate the nation's students like Finland does. Additionally, in 2018, about 54% of parents expressed that they would not like their child to become a teacher. There was a

4% decrease in average national salary for teachers and there is a national shortage of teachers, which has led to staffing instructors who are not fully qualified to teach (Hampson, 2018). Students then receive an inadequate education because instructors are not confident about the material they teach.

The increased pressure to perform well on standardized tests leads to "teach to the test" methods that result in uninteresting lessons and diminish the students' passion to learn. In a survey about teacher motivations, teachers entered their profession to make a difference in student lives and that they believed teaching is more than academics- it is about increasing good citizenship, resilience and social skills. However, teaching became automated after Reagan's "Nation at Risk" and public approval of the profession reduced (Bruno, 2018).

Based on these differences, the US could improve on the way it treats its teachers. In both Finland and Singapore, the teachers are well-respected and knowledgeable. However, in the US, teachers are underpaid, underqualified and constricted in their teaching methods. Although a feature of the Singaporean education system is "scripted" pedagogy, the cultural differences between the US and Singapore, where the collectivist attitude puts needs of the society over the individual, mark the difference in attitude toward pedagogical limits.

Cross-Cultural Analysis: Education Inequality

In all three countries, students that were socioeconomically advantaged outperformed students who were disadvantaged. According to PISA, socioeconomic status was a strong predictor for performance in science and math where 14% of variation on average could be attributed to this factor (OECD, 2018[a]). In terms of achievement gaps, the OECD average difference in reading scores for advantaged and disadvantaged students was 89 points (OECD, 2018[a]). Finland had the lowest reading achievement gap with a score difference of 79 points,

which is below the OECD average (OECD, 2018[a]). The United States was somewhere in the middle with a score difference of 99 points (OECD, 2018[c]). Singapore had the highest gap in scores where the advantaged students, on average, outperformed disadvantaged students by 104 points (OECD, 2018[b]).

The differences in scores could be a result of each country's view on equality. For example, Finland and the US both stress equal opportunity and their reading score achievement gap is smaller than Singapore's. Singapore also stresses equal opportunity in schools (where there can be class movement based on merit), but overall believes that an unequal balance of power is necessary for society to function, which could explain their greater reading achievement gap; that students are expected to perform their best, but not necessarily at the same level.

Students from low socioeconomic backgrounds are educationally at risk. From birth, there are studies that show a correlation between literacy skills and number of books owned, parental distress and the home literacy environment. However, disadvantaged groups usually do not have the resources to buy these materials for their children (American Psychological Association [APA], n.d.).

In general, students from these groups have poor development in language, memory and cognition due to reduced access to resources (among other factors). Disadvantaged students are more likely to be years behind their advantaged peers in academic skills and have increased dropout rates (APA, n.d.). With so many factors working against them, these students require a lot more resources during school to close the skill gap. Finland offers special programs for students that are disadvantaged or new to the country and the teachers are paid more and sometimes have graduate degrees to better serve students in need. Teachers in the US, on the other hand, barely get paid enough to teach advantaged students.

What Can the US Implement?

Based on the information above, Finland is a more reasonable educational model for the US to follow because both countries share individualist beliefs and Finland emphasizes the goal of teaching students how to reason and direct their learning- a goal that the US should want to accomplish as well. Project-based learning, interdisciplinary learning modules and less reliance on standardized testing are aspects of Finland's education system that the US can easily integrate into its own. In terms of disadvantaged students, Finland has the correct approach by offering more resources to catch students up instead of leaving them behind. Finland also does well in respecting teachers and paying them well, but solutions to these features are beyond the scope of this thesis. However, increasing flexibility in teaching methods is something the US can encourage if standardized tests are eliminated from the system, or reduced in importance.

There is not much overlap between the US and Singapore and, based on the evidence, Singaporean students, although excelling in tests, are not enjoying their education, which is not an outcome that the US wants to replicate. Even the practice of streaming, which is somewhat similar to the US's tracking, should not be implemented because there is a high risk for funneling disadvantaged students into low-paying professions, increasing discrimination and perpetuating the cycle of poverty- all of which goes against the American belief of equal opportunity. However, Singapore's respect for the teaching profession and the country's shift toward warmer student-instructor relationships should be commended.

Closing Commentary

There are stark differences in the cultures, values and instructional freedoms between Finland, Singapore and the US, which negates the option of transplanting a successful education model into the current education system. The purpose of examining other education systems is to

find aspects that, if introduced, could benefit the US. For example, integrating interdisciplinary and project-based instruction in lessons, building respect for teachers and offering resources to disadvantaged students. However, stating that Finland is doing better than the US, or that Singapore is outperforming the US is illusory.

Educational success of a country cannot be determined by a standardized exam, like the PISA, because achieving a full score on a reading, science and mathematics-based exam does not consider the cultural variations and goals that impact the individual education systems. The process of the exam is like taking a variety of different fruit, isolating three common qualities they all have, creating a metric to assess these qualities and ultimately deciding which fruit is the best fruit of all. The reality is that different people consider different fruits to be the best. In the same way, there are different societies that consider their own education systems to be good and effective for educating their country's children; there is no need to compare apples to oranges.

The best direction for the US to take is to focus on itself, but not closing itself off to methods that could improve the current system. Isolating goals that the US wants to accomplish in its students, that are not based on test scores, will help the US preserve its national identity and improve the quality of education. By having a well-educated citizenry that can critically think, problem solve and apply their knowledge, the US will be able to grow as country and become more competitive on a global scale.

Chapter 5: Using the Known to Venture into the Unknown

"There's a way to do it better- find it"

-Thomas Edison

Before tackling a task as large as improving the education system, there needs to be a solid foundation of knowledge that can be used to qualify potential changes. Determining that the most reasonable goal for the US is to promote a passion for learning and growing the mind by teaching students how to think, the next step is to find out methods that can further this goal. Specifically, the contents of this chapter will offer a model for high schools to further develop reasoning abilities and prepare them for society.

The goal of the reformed US education system is to facilitate student learning instead of memorizing and regurgitating information for high test scores and grades. Based on the biological processes involved in learning, an interdisciplinary approach to education enhances the brain's natural abilities to learn and store information while ensuring that the individual can remember and use the information they learned when necessary.

Benefits of Synapses and Strong Neural Networks

The brain is composed of cells called neurons, and synapses are how neurons communicate with one another, so it would follow that a greater number of synapses would mean increased communication within the brain. In general, synapses are pruned (destroyed) The based on the "use it or lose it" principle and lasts until the late adolescent years (Huttenlocher and Dabholkar, 1997), so if an individual were to constantly stimulate the existing synaptic connections then there would be less synaptic connections pruned (Edelman, 2014).

To prevent pruning, these synapses could be stimulated through engaging in a variety of activities, like interacting with high stimuli environments and learning new things. Having an

appropriately robust network of connections confers benefits to the brain in the form of plasticity- the brain's ability to modify connections between cells to better cope with new circumstances (Andrews, 2010). Increased plasticity offers benefits like slowing cognitive decline, allowing individuals to preserve cognitive function longer in old age (Shaffer, 2016). Therefore, it is beneficial to create more synaptic connections and prevent excess pruning.

One method of increasing synaptic connections and creating a robust network is through challenging the mind and learning new skills (Shaffer, 2016). When the brain learns a new task, neurons begin to signal other neurons that may not have been signaled before and form a pathway over time. This pathway increases the speed of performing the new task and can increase efficiency of the brain overall. Learning has also been associated with increased myelination of axons, which increases the speed of electrical impulses, which improves neuron signaling ability and could increase learning speed as well (Stevens, 2014). In addition to increasing connectivity and efficiency of existing neurons, learning a new skill increases neurogenesis in the hippocampus, which is associated with memory processing (Gould et al., 1999). Learning increases an individual's health and makes learning new tasks easier.

How Information Enters the Brain

When encountering new information, there are a set of actions that need to occur, at times simultaneously, so information can be processed and integrated into long-term memory. The three components of integrating information are sensory memory, short-term/working memory and long-term memory (Huitt, 2003). First, unless attention and focus are given to an incoming stimulus, it will not enter sensory memory (McLeod, 2008). However, once a stimulus has entered sensory memory it has to be modified for short-term memory; the modifications usually involve grouping the initial stimulus with either a visual, acoustic or semantic component. If

information enters long-term memory, it can be stored indefinitely and can be retrieved when properly associated (McLeod, 2013). Learning is then the ability to input stimuli, integrate it into working or long-term memory and be able to use that information to facilitate learning new information and solving problems.

Process of Learning: Actions Outside the Body

First students need to acquire a base of knowledge when they are younger either through direct instruction or through guided activities. Students learn best when they are appropriately challenged and offered guidance on a task or skill; this is called the zone of proximal learning. By allowing students to learn for themselves, they build stronger connections with the material (McLeod, 2012).

After fundamentals are learned in earlier grades, students are expected to build knowledge from those basics. Just like how attention to stimuli in the information processing model integrates information into sensory memory, focusing on a task and practicing it over periods of time increases students' ability to interact with the material and increase understanding (Bransford et al., 2000, p. 236).

The modification of information facilitates the transfer of material into memory stores and that same modification process occurs when students add context to what they learn-increasing the flexibility of the material (Bransford et al., 2000, p. 236). Here, new knowledge is presented in relation to multiple contexts and the student is able to not only connect these multiple contexts, but also better integrate new information by combining it with prior knowledge. By demonstrating the flexibility of the material, students are able to use this new knowledge in multiple cases, which improves their problem-solving abilities. Once students

acquire knowledge, the process of connecting and applying this information can be further solidified through problem-based learning (De Bruyckere et al., 2015).

Other methods of integrating information into short- and long-term memory are through various combinations of semantic, acoustic and visual aids. Mental imagery, for example, adds a visual component to information by associating images with a concept- especially a linguistic concept (Chang, 2015). One example of mental imagery is imagining a fat cat with a plus on its belly to remember that cations are positively charged ions.

Another method of encoding information is through mnemonics, through which students can pair difficult information with something easier to remember. This can be a semantic modification where meaning is added to information, or an acoustic modification where a rhyme or sound can help increase encoding and recall. For example, “never eat shredded wheat” is a mnemonic device to remember the cardinal directions, or “please excuse my dear aunt sally” to remember PEMDAS, which is an acrostic (another mnemonic device) for the order of operations in math. By linking more difficult material with mnemonic devices, there is a greater chance for encoding and retrieval. However, the downside of this method is that it does not increase a student’s ability to apply the stored information (Chang, 2015).

For direct memorization of topics without the use of images or other created aids, students can use organizational methods like chunking. In this case, material is broken down into smaller parts based on commonality or shared attributes, which makes memorization of the broader categories and associated items more manageable (Chang, 2015). The categories that are associated with new information is a form of semantic modification because there is added meaning that makes the new material easier to process. This is the strategy people use to

remember phone numbers; the seven digits are split into three smaller groups and the groups are memorized.

Rehearsal or repetition of material pairs visual information with acoustic and prolongs the amount of time information will stay in one's memory. One criticism of this technique is that it is not effective for remembering information in the long term (Chang, 2015). However, focused rehearsal combined with contextualizing and semantically modifying the information will lead encode the information and increase the flexibility in application (De Bruyckere et al., 2015). The statement practice makes perfect, holds true when it is known that repetition leads to automaticity- the ability for an individual to practice a skill without deliberate thought and perform functions quickly (Speelman and Shadbolt, 2018).

Process of Learning: Inside the Brain

Returning to a neuronal level, when a person ventures to learn or perform a new task, neurons begin to transmit messages to other neurons leading to long-term potentiation, or the process of increasing synaptic strength. At first, the electrochemical messaging between cells is slow because the brain is not used to thinking in this certain way or performing these certain skills. The brain's reward system, however, rewards the pathway if something is done correctly, which improves neural ability to receive messages from other neurons by increasing the number of receptors and strengthens the pathway overall.

Once the pathway is strengthened through repeated successes, neurons are able to send messages quickly and the task or skill becomes more automatic for the person. This is the cell-level action that explains why, when students practice consciously, they are able to improve in ability- their synapses are strong, and the neural pathway has been established due to long-term potentiation (Quora and Wingeier, 2018).

Applying the concept of neuron signaling to the benefits of contextualizing information, it has been established that a strong neural network leads to increased plasticity, processing speed and a greater ability to learn other skills, but how is this possible?

By adding a new dimension of thought each time a skill or concept is rehearsed, the initial synaptic pathway is reinforced, and the new context connection creates another synapse with a cell that was not a part of the original signaling pathway. The more connections that are established, the more robust the neural network is. Similar to a wide road that diverges into multiple smaller roads, this neural network offers multiple directions where a thought can lead, which increases an individual's problem-solving ability because they have increased the flexibility in application of that concept or skill by bridging it with other concepts and skills. If using a specific pathway when solving a problem proves successful, the reward pathway will strengthen that synaptic pathway, and, in similar future situations, a person will be able to react faster (Quora and Wingeier, 2018).

A Case Against Cramming

The suitcase analogy, provided by New York Times science reporter Benedict Carey, is that the study practice of cramming is like hastily jamming large quantities of clothes into a cheap suitcase- for a brief amount of time the suitcase will hold its integrity, but a short while later the clothes will spill out. The process of cramming has short-term benefits, but eventually the material will be forgotten. When a suitcase is packed over time with attention to detail, it is more likely to hold its contents effectively; studying material over a period of time will increase acquisition and later recall (Carey, 2010).

In a study aimed at determining if spacing or massing had a greater impact on learning, researches wanted to test what conditions allowed participants to learn the styles of different

artists. There were 12 artists with 6 paintings each, and the artists were split equally (6 and 6) into a massing group and a spacing group. For artists in the massing group, all their paintings were shown in succession in one block before moving to the next artist's six paintings. For artists in the spacing group, their artwork was shown out of order; each spacing block contained 6 paintings by different artists. The participants needed to learn the styles of all 12 artists, so they were presented blocks in the order MSSMMSSMMSSM (M is for massed artists, S for spaced). After going through the blocks, the participants were asked to identify the painter based on a painting, as well as which method they thought was more effective: massing or spacing. The results showed that more participants were able to correctly identify the styles of painters in the spacing condition than the massing condition, but that participants thought massing was more effective (Kornell et al., 2010).

The results of this study indicate that people believe immediate repetition will lead to greater outcomes, but material that was repeated after longer periods of time had a greater increase on learning performance. Applying this result to the practice of cramming, which is numerous repetitions of information over a short period of time, it would be more beneficial to revisit material after longer time intervals. There is a concern that an individual will forget the material if it is revisited after a long time, but forgetting information and re-learning actually strengthens the skill or concept in the mind and reduces the likelihood of forgetting after multiple periods of spaced repetition (Kornell, 2010). Unfortunately, more research needs to be conducted to determine why this practice is effective, but cramming, for sure, is not a learning strategy (Carey, 2010).

What Affects Learning?

According to Maslow's Hierarchy of Needs, before an individual can focus on self-actualization, feeling fulfilled and living up to one's potential, they must meet their prerequisite needs: physiological balance, safety, love/belonging and esteem (Hopper, 2020). Any source of deprivation within these categories is a form of stress to the body, the mind, or both. Having enough to eat and drink consistently allows the body to carry out its necessary tasks. Getting enough rest is important to maintain brain function; there is additional evidence that sleep deprivation can reduce neurogenesis (Shaffer, 2016), have negative impacts on achievement and result in reduced motivation, which is an essential component to learning (Wheaton et al., 2016).

Also, limiting emotional stress and managing metal health also will benefit brain health. There are several health risks associated with stress including memory loss, which directly impacts learning (Mayo Clinic, 2019). There is evidence that supports that, if uncontrolled, depression can lead to oxygen deficiency or inflammation in the brain, or even brain shrinkage. Among the affected regions are the hippocampus, prefrontal cortices and amygdala that are key structures in learning and memory (Wilson, 2018).

Referencing students with reduced academic achievement from low socioeconomic groups, their limited access to resources influence wellbeing. There are cases where students work after-school jobs to help support their family that contribute to reduced hours of sleep. Some students rely on free or reduced lunch programs because they might not have access to nutritious food at home. Individuals from these groups might be stigmatized or discriminated against for a variety of reasons, which contributes to social stress and lower esteem. Based on these conditions it is clear why many individuals from these groups are at risk for cognitive

delays and dropping out of school (APA, n.d.). The ideal condition to learn is when an individual is physiologically satisfied and mentally cared for.

The Benefits of Writing

Writing can be a great tool for students to enhance their learning experiences and develop their abilities. In expressive writing that integrates thoughts with feelings, when practiced correctly, can help individuals work through trauma and, in the case of writing about the future and setting goals, it can make people feel happier (Grant, 2013).

In situations where a person feels overwhelmed, the process of writing tasks, or other sources of stress, down on something that can be easily referenced will allow the brain to forget and ultimately reduce the overwhelming feeling (Konnikova, 2012).

In addition to enhancing and processing emotions, writing offers cognitive benefits. The practice of writing, especially hand-writing, aids fine motor skills and can improve expression and idea composition (Bounds, 2010). The practice of writing and reflecting after learning can also reinforce the material that was learned as well as improve communication skills (Willis, 2011).

There is also evidence to suggest that writing will improve critical thinking skills. In a study, students in a biology class were assigned to a laboratory writing group or a quiz-based laboratory group and the results of this study indicated that students in the writing laboratory group improved in analytical and inference skills, as well as improvement in evaluation ability in comparison to the quiz-based group. If the results are generalized, then it would indicate that writing enhances critical thinking skills (Quitadamo and Kurtz, 2007).

Based on the cognitive and emotional benefits, writing can be a useful tool in learning new skills, bridging disciplines or thoughts, improving communication abilities and enhancing quality of thought.

Promoting an Interdisciplinary Approach to Education

Aligning with the philosophers and education theorists of the past and present, a well-rounded education should be pursued because it is the best way to further the end of developing reasoning abilities. However, in a current educational climate where the focus is on career preparation and global competitiveness, a general/non-specialized education is subject to criticism.

Thomas Benson from the University of Maryland offers his views against interdisciplinary education. One of the concerns Benson brings up is that when students commit themselves to integrative studies it negatively affects the student's main development of disciplinary competence. He does concede (slightly) that some students will find integrative studies useful in the future, but for the vast majority of undergraduates, Benson feels that integrative studies are a distraction from the real curriculum that higher education institutions provide to prepare students for the real world. Benson also states that having a feeble foundation in a specific discipline puts people at greater risk for "disqualification" regarding graduate school and job opportunities (Benson, 1982).

In response to Benson's anxiety about the future careers of interdisciplinarians, it appears that Benson was focused on the subject matter itself and didn't focus enough on how learning these subjects can benefit a student's mind. A study in 1988 worked to identify the benefits of interdisciplinary ventures and the results were well aligned with previous predictions. There was an increase in development of cognitive skills when subjects were able to integrate old with new

ideas, improvement in reading and writing skills, as well as improved creativity in thought processes (Newell, 1989) (Misiewicz, n.d.).

Although these skills do not directly translate into a job position, the skills are nonetheless important. An article from Forbes discussed what employers look for in employees, and the main points were based on how the employee solves problems, interacts with others, and learns (Ryan, 2016). A degree can help get an applicant through the door, but employers are looking for a lot more than rigid disciplinary skills; dynamic employees that can adapt to new challenges are more likely to be hired, which is what an interdisciplinary education can offer students.

Interdisciplinary learning can help a learner build a robust synaptic network because bridging different disciples leads to more synaptic connections- increasing the brain's potential plasticity. Integrating new information with old information also improves the brain's ability to encode and retrieve information, as well as be able to use this knowledge more readily- improving problem-solving abilities. Therefore, interdisciplinary learning can make learning new material easier and increase the ability to apply information- both of which further the educational goal of teaching students to reason.

Interdisciplinary learning and teaching also has support in Finland, where these practices are integrated into the education system so that students are able learn by doing, understand phenomena, promote interest in learning and learn to think independently. Based on the success of Finland's students in reading, writing and arithmetic, as well as the scientific evidence that confirms the practice's efficacy, it would be beneficial to adopt interdisciplinary methods into the US education system.

Synthesizing the Findings

The best learning conditions do not involve stress, instead a student must be physiologically and mentally prepared to learn. Last minute cramming sessions to make a good grade on a test or assignment will not commit any of the material into long-term memory, but also there is a benefit to forgetting because the process of re-learning strengthens that synaptic pathway. By having a robust synaptic network, which is developed by learning and making connections, there are many health benefits including brain plasticity, improved learning of other new materials as well as increased speed and flexibility of thought. Interdisciplinary practices and writing can help strengthen these synaptic connections and improve critical thinking skills. Therefore, if a new education system wants to further the goal of student learning, then there are clear methods that are biologically supported to achieve that goal- all that remains is to reform the system to increase the efficacy of these practices.

Conclusion: A Renovated Education System

"You can design and create… but it takes people to make the dream a reality."

- Walt Disney

The education system has served a multitude of students and, despite its flaws, continues to function. However, just because something works, does not mean it should not be improved. The pursuit of efficiency and mental competitiveness introduced standardized testing to the education system and students have suffered as a result. After investigating the origins of these practices, comparing the US with other countries and understanding the process of learning, this proposed education model will correct the missteps of the past.

A Quick Recapitulation

The first chapter of this thesis focused on the history of education and how a fear of underperformance lead to reforms that introduced standardized testing into the US education system. The second chapter then evaluated the problems within the US education system including overreliance on tests and scores, the reprehensible teach to the test strategy that many teachers are forced to employ, reduced mental health of students in a competitive environment, efforts to promote early specialization and the systemic perpetuation of poverty in disadvantaged groups. After establishing what was wrong with the current education system, the theoretical reformed education system needed a different focus to address the needs of the US without perpetuating any of the mistakes outlined in the second chapters. Ultimately, the goal that would satisfy all needs both directly and indirectly was that the education system must teach students how to reason and learn.

The fourth chapter determined that the PISA exam was based on false assumptions that there is only one superior educational system and that countries can be compared to one another.

However, there are pedagogical methods from top performing countries, like Finland and Singapore, that the US could integrate into its own education system. Finland and Singapore both value the teaching profession (unlike the US), and Finland does not rely on standardized tests, integrates interdisciplinary and project-based learning into the curriculum and allows teachers the freedom to choose how they can teach concepts. Finland also works to reduce achievement gaps in foreign and disadvantaged students by paying teachers more to provide specialized instruction.

The fifth chapter provided a scientific basis for learning and how to use biology to education's advantage. The findings supported that interdisciplinary education correlated with improved critical thinking skills and could increase the ability to store and remember new information. There is also evidence that the process of re-learning material helps integrate it in memories longer through the spacing effect. Writing can also be a learning tool that can help increase critical thinking abilities and emotional regulation. Therefore, it would be beneficial to integrate these practices into a reformed education system.

The Proposed Reforms

College Entrance Exams

The first feature of the old education system that must be modified are standardized tests like the state-mandated tests, the SAT, the ACT and AP exams. Starting with college admissions tests, the SAT and ACT hardly cover the material students are learning in schools and the scores do not correlate with how well students will perform in college. These exams should be modified into an essay-based format with prompts that require students to demonstrate their communication abilities and depth of thought as a metric for college readiness. In terms of the business side of education, to preserve companies like College Board, test-making businesses

should be incentivized or directed to create complex essay prompts and that the process of thought is what determines scores received.

The one downside of making all tests short answer or essay-based is that it will take a lot more time and concentration to score them. Possible solutions would be to pay graders more money and offer paid leave from other jobs they may hold.

AP and State-Mandated Exams

Based on the study that indicated that even short-answer or essay-based exams did not lead to enhanced teaching methods, there should not be AP exams or state-mandated tests. This would prevent schools from feeling a top-down pressure for students to succeed and eliminate "teach to the test" practices because there are no tests to model after.

Furthermore, for using state-mandated tests to assess achievement, if the education system has produced qualified teachers, then there should be no doubt that students are achieving what they need to be achieving. There should be more trust in the abilities of teachers. If the education system is not producing qualified teachers, then that is another matter that should be addressed.

AP exams seem to benefit students financially, so removal of these exams would not hinder their learning because teachers can still teach these subjects, but with more freedom. The financial benefits lost through eliminating these exams can be rectified through college-level reforms, but those are beyond the scope of this thesis.

How will students be assessed?

The American value of competition must be respected and, unfortunately, there needs to be methods of distinguishing between students when applying for competitive schools and jobs.

Therefore, the grade system must be preserved. However, what the grades are based on can change.

Students should be given short answer or essay-based assessments in their subjects and teachers can grade these on a simple letter-grade system. A's will be given to those who demonstrate clarity of thought, extended application of learning concepts and mastery of material, C's for those that demonstrate some understanding of the material without being able to apply it and F's for those that are completely lost. Short answer questions should be graded slightly differently since there are less opportunities for extended application, but mastery of the concept should be preserved in the grading criteria.

Regarding how these tests will be created, teachers should be paid to attend workshops that focus on enhancing teaching methods and asking complex questions so that students are encouraged to think for themselves and interact with learning material more.

Learning in the Classroom

Society directs education. The US already has Common Core and state standards, but slight modifications on the national and state level can allow teachers to exercise more autonomy over how they structure their curriculum to address these goals. The standards should include general topics within a subject and competencies, but there should be enough space for teachers to employ the lessons and methods they want. The elimination of state-testing will also allow teachers more pedagogical freedom.

Ideally teachers should collaborate with other teachers of different disciplines within the same school and discuss how concepts from one discipline interact with concepts from other disciplines. This collaboration effort would reduce the pressure for teachers to know everything about all subjects, but if presented to the class through thought experiments, projects, or free-

writing prompts, students will be able to bridge disciplines on their own and solidify the material they learned in multiple classes. These teacher collaborations can take place over the summer and last 2-3 weeks as teachers build their curricula around state and national standards.

During a normal classroom session, after the instructor has gone through the basic components of the new material, students should take 10-20 mins at the end of class to write down what they learned that day, how it impacted them and how this information could be useful in the future. The practice of writing will help enhance memory and thinking skills. Asking students to apply these concepts will help in creating a robust synaptic network that also improves memory. Revisiting these reflections over time, referencing the spacing effect, can also be a great tool for studying before an exam.

Teachers should not be expected to only lecture to their students because the passive transfer of information is not conducive to teaching students how to reason. Instead, teachers should encourage students to work in groups and investigate a different perspective, an application, or attempt to fill a "hole" using the concepts presented. These assignments can focus on developing students' abilities to read, write, build arguments and present evidence in a logical manner.

Homework should be assigned sparingly because an overload of homework can increase stress levels, reduce amount of time spent sleeping and encourage cramming behavior (if a student falls behind). In the beginning of introducing new concepts there should be simple direct application questions, but over the course of the unit, homework questions can become more advanced- but not necessarily more difficult if the student has kept up with the material. Students should have three free days a week without homework so that they can revise old material.

Disadvantaged Students

The only way to help disadvantaged students is to offer individualized attention and work on skills at their pace on top of classroom learning, similar to Finland's approach. There are still environmental and physiological stressors that may be beyond the school's control, but specialized instructors can help with academics. Unfortunately, the education budget is not a part of this thesis, so the feasibility of implementing this change is yet to be determined.

Limitations and Discussion:

All that this thesis can endorse is that interdisciplinary teaching and writing has scientific benefits for student learning and helps improve critical thinking. How teachers can effectively promote these skills is another area of research, but, if implemented correctly, will be beneficial.

The feasibility of implementing any of these reforms are somewhat low, given that most of these changes will require a complete refocus for education goals, extra funding and a legislative decision to end standardized testing. However, if there is enough dissatisfaction in the system, change is possible. If standardized testing is eliminated, it will be easier to implement the other reforms.

More discussion is required for how teachers can bridge disciplines in their lessons, how to address achievement gaps in disadvantaged groups and how colleges can reform their practices to make higher education more accessible. There should also be further research done on education spending to determine if there is a way to increase teacher salaries and subsidize continuing education classes.

Overall, these proposed changes should be viewed as a guideline for future reform and are subject to change over time- as is the fate of all reforms.

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Biography

Sweta Ganta was born in Portland, OR, but has lived in Columbia, MD and Auburn, ME before settling in Austin, TX. Living on every coast and jumping from private schools to public schools, her diverse experiences as a student inspired her to evaluate the education system. During her time in college she participated in Natural Sciences Council, Plan II Pre-Medical Society, Health Advocacy Student Coalition and volunteered at People's Community Clinic. In the spring, she will graduate from The University of Texas at Austin with a degree in Plan II Honors and a minor in Health Communications.